ASSOCIATION OF COLLEGE AND CAREER READINESS INDICATORS

ON HISPANIC COLLEGE ENROLLMENT AND

POSTSECONDARY RESILIENCY

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Dissertation Prepared for the Degree of

DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

May 2018

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Parker, Patricia. *Association of College and Career Readiness Indicators on Hispanic College Enrollment and Postsecondary Resiliency*. Doctor of Philosophy (Curriculum and Instruction), May 2018, 203 pp., 5 tables, 7 figures, references, 149 titles.

This investigation was a post-hoc, quantitative analysis of secondary academic performance and participation choices of Hispanic students. Three years of longitudinal student-level data was collected to examine the likelihood of college enrollment based on college and career readiness (CCR) factors. At the time of the study, CCR was defined as qualifying exam scores, credit for at least two advanced/dual enrollment courses, or enrollment in a career and technology education (CTE) coherent sequence of courses. Research participants (N = 803) consisted solely of Hispanic high school graduates from the 2014 cohort. Frequency statistics indicate 45.5% (n = 365) attended an institute of higher education (IHE) within 2 years of high school graduation. Findings reveal Hispanic females were more likely than Hispanic males to meet CCR indicators as well as postsecondary resiliency outcomes. Analysis of chi-square tests of independence suggests a moderately strong association exists between CCR indicators and postsecondary participation among high school graduates. Differences were found in terms of gender and postsecondary enrollment, $\chi^2(6) = 24.538$, $p < .001$. Differences were also found in terms of type of IHE and postsecondary resiliency, $\chi^2(3) = 34.373$, $p < .001$. More Hispanic CCR graduates enrolled at 2-year and 4-year IHE than expected by chance. While non-CCR graduates enrolled in IHE, they were less likely to meet postsecondary resiliency outcomes. CCR graduates who initially enrolled at 2-year IHE

were also less likely to persist. Furthermore, the greatest contribution to differences in resiliency existed for Hispanic CCR graduates who enroll at 4-year IHE.

ACKNOWLEDGEMENTS

I would like to acknowledge Daryl R. Parker for his steadfast support of this work. His talents in the art of learning and teaching were a remarkable contribution to the field of education.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ASSOCIATION OF COLLEGE AND CAREER READINESS INDICATORS ON HISPANIC COLLEGE ENROLLMENT AND POSTSECONDARY RESILIENCY

Introduction

Extensive research has shown educational attainment beneficial to overall well-being when factoring in race and ethnicity (Carnevale, Jayasundera, & Gulish, 2016; Greenstone, Looney, Patashnik, & Yu, 2013). What is lesser known is how to transition high school graduates successfully onto a postsecondary path that increases earnings and social mobility. One area of concern is that while the pool of university-bound applicants educated in the public school setting has become substantially larger; so too have the implications of entering college ill prepared for the rigors of postsecondary work. In response, measures of college and career readiness (CCR) are gaining weighted value within school accountability systems and drawing the attention of public school stakeholders.

Background

For the purposes of this study, I reviewed literature addressing the relationship between education and future earnings, measures of CCR, and the role of accountability policies. A large body of evidence links the relationship of postsecondary education to future earnings and factors of social mobility. Access to educational opportunities during K-12 years is well known and consistent with social policy reforms to close achievement gaps (Boykin & Noguera, 2011). More education generally translates into more dollars earned and few investments yield as high of a return as a college degree. For many, postsecondary education can be the ticket out of poverty.

On average, college graduates typically earn twice as much as high school graduates and experience higher earning success over time (Carnevale & Cheah, 2015; Carnevale, Strohl, & Melton, 2011). Reports of educational attainment in the United States reveal only 32.5% of the nation's population age 25 years and older held a bachelor's degree by 2015 (Ryan & Bauman, 2016) thereby fueling the debate over income inequality and the role of public education in preparing the next generation's labor market (Perna & Finney, 2014). Accordingly, wage disparity tied to educational attainment has led to growing concerns that "inequality of income for one generation may mean inequality of opportunity for the next" (Greenstone et al., 2013, p. 1). A common theme running through various investigations is access to challenging educational opportunities prior to high school graduation.

Research on postsecondary participation rates for minority and low-income students increasingly show advanced level/dual credit coursework positively linked to college success (Bromberg & Theokas, 2014; Xiang, Dahlin, Cronin, Theaker, & Durant, 2011). Furthermore, findings on accelerated instruction suggests Advanced Placement (AP) exam performance correlates with later success in college (Brody & Benbow, 2004; Burney, 2010; Colangelo, Assouline, & Gross, 2004; Robinson, Shore, & Enersen, 2007). Additional empirically based research studies have found access to accelerated instructional practices, common to AP/IB programs, have a positive influence on multiple academic success factors. These findings attribute significant gains in increasing enrollment in rigorous courses (Burney, 2010), the awarding of college credit during high school (Bromberg & Theokas, 2014), closing the achievement gap (Xiang et al., 2011), and college completion within 5 years (Hanover Research, 2012).

Alternatively, dual credit and career-technology education (CTE) programs function as a bridge between secondary and postsecondary education while students are still in high school. They provide high school students an opportunity to enroll in college courses and receive academic credit for both high school and college simultaneously. Due to higher demands for technologically advanced workforce, a greater percentage of CTE students are linking their 4-year high school graduation plan to a 2-year associate of applied science degree (Davis, 2008). Furthermore, students who enter CTE during their first year of community college earn diplomas or industry certificates at a higher rate than their peers (Jenkins & Cho, 2012). Prior studies have also shown dual credit and CTE programs positively increase student motivation (Asunda, 2012; Kovarick et al., 2013), academic success in college (Bailey, Hughes, & Karp, 2002; Holzer, Linn, & Monthly, 2013; Miller et al., 2017), and the earning of degrees or industry certificates compared to their peers (Jenkins & Cho, 2012).

The passage of Every Student Succeeds Act (ESSA, 2015) seeks to shift the investment of education from a K-12 path to one that provides alternatives to the traditional 4-year college track and seeks to develop postsecondary 21st century workforce skills. In the initial phase, the ESSA marks a substantial overhaul of federal education policies related to assessment and accountability in public schools. It returns performance reporting to state and local education agencies while simultaneously requiring standards to prepare all students for success in college and future careers (U.S. Department of Education, 2017). Previously, under the No Child Left Behind

(NCLB) Act of 2001 (2002) legislation, national oversight was based solely on the measurement of grade level student achievement performance objectives in order to increase high school graduation rates. ESSA (2015), on the other hand, ties educational rating systems to high school CCR targets in order to increase postsecondary graduation rates and requires states to govern their own policies associated with postsecondary readiness.

In 1993, Texas was one of the first to enact statutory requirements mandating public school accountability systems rate school districts and evaluate schools (Texas Education Agency, 2017a). NCLB (2002) instituted widespread national oversight tied to specific grade level, student achievement targets. However, in Texas, in addition to earning a prescribed number of course credits and days in attendance, students in public schools are also required to demonstrate mastery on state assessments to meet high school graduation requirements. Since the onset of state assessments in 1995, there has been substantial pushback on the use of standardized testing to demonstrate mastery levels of learning. By design, testing becomes high-stakes when the student's performance has significant bearing on future educational outcomes such as high school graduation or entrance to colleges (Madaus, Russell, & Higgins, 2009). Using tests to award or withhold high school diplomas centers on the premise graduation decisions are inherently certification decisions in that the "diploma certifies a student has attained an acceptable level of learning" (Heubert & Hauser, 1999, p. 166).

Critics argue that a large number of students became marginalized when Texas began holding all students to a single grade level standard (Johnson, 2009). Nevertheless, accountability advocates counter that without standardized testing and performance targets, students of color or those living in poverty continue to become disenfranchised. Test scores then, in their opinion, act as a barometer of proficiency. Using a method of qualitative meta-synthesis of 49 studies, Au (2007) found high-stakes tests in and of themselves do not necessarily narrow curriculum content solely to the tested subjects. Within his findings, high-stakes testing did in large part affect the content control over curriculum and significantly increased the use of teacher-centered pedagogical control over curriculum. Furthermore, policy-makers tend to be attracted to high-stakes testing as a system of monitoring problems associated to society and education. Since they cannot directly regulate instructional practices in the classroom, mandatory testing is often used to influence classroom instruction by attaching rewards and sanctions to measures of student learning creating something of a paradox within high-stakes testing in that the results of test scores are used for contradictory purposes (Madaus et al., 2009).

Texas currently has five end-of-course (EOC) high-stakes tests as a requirement for high school graduation: Algebra I, Biology, English I, English II, and U.S. History (Texas Education Agency, 2017a). Moreover, Texas has been redefining postsecondary readiness factors since the passage of House Bill (HB) 3, in 2009. Most recently, postsecondary readiness measures were expanded to include additional accountability indicators. In 2015, the focus shifted from graduating students as college-ready based on a college entrance exam, e.g. SAT/ACT, to graduating students as college and work force ready under college and career readiness (CCR) accountability indicators. My aim in the current research was to determine the association of CCR indicators on Hispanic postsecondary enrollment and resiliency outcomes. Currently Hispanic students account for 52.2% of total enrollment of public schools within the state (Texas Education Agency, 2016). As such, the value of Texas public school systems will define the future wages and social mobility for the largest percentage of our students. The school district selected for study was a minority-majority, urban, public school district located in the North Texas area with district enrollment of over 26,500 students. I selected the class of 2014 as it was the first cohort in Texas to graduate under the postsecondary CCR calculation methodology.

Previously, the state's accountability system defined postsecondary readiness as the percentage of high school graduates who met a college-ready indicator based solely on benchmark exam scores on either state (TAKS) or national college-readiness exams (SAT/ACT). Beginning with cohort 2014, two additional measurements were included in the CCR rate and both criteria involved high school course completion requirements. One was the earning of high school credit in advanced level or dual credit courses prior to high school graduation. The other was completion of career and technology education (CTE) courses in a designated sequence over a 2 or 3 year period of high school. Thereby, students could meet any one of the three measurements: benchmark exam scores, advanced level coursework, or CTE credits.

With this study, I built on prior investigations through an analysis of student level academic records for a total of 803 Hispanic high school students and 657 who met one or more CCR indicators from the graduate class of 2014. The current research differs from previous in that I extended the examination of postsecondary enrollment patterns beyond the first year of college enrollment. In addition, I expanded the methodology for measuring factors of postsecondary readiness beyond a single indicator. At the time of the study, Texas defined CCR as a measurement of high school graduates that meet any of three postsecondary readiness targets:

1. earn a minimum benchmark score on exit-level state assessments or college entrance exams in both reading and mathematics;
2. earn credit for at least two advanced/dual credit courses during the current or prior year of high school student’s graduation; and
3. enroll in a coherent sequence of CTE courses over 2 or more years earning three or more high school credits (Texas Education Agency, 2015).

Research Questions

To explore the association of CCR on Hispanic postsecondary participation, I examined three state accountability indicators as they related to institutes of higher education (IHE) enrollment and resiliency outcomes. I used data collected from an urban public school district in the state of Texas to investigate the following research questions:

RQ1. Is there a statistically significant difference in postsecondary enrollment between Hispanic high school graduates identified as college and career ready and non-CCR graduates?

RQ2. Is there a statistically significant difference in postsecondary enrollment between Hispanic males and Hispanic females identified as college and career ready and non-CCR graduates?

RQ3. Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates?

RQ4. Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates at 2-year and 4-year institutes of higher education?

Conceptual Framework

I chose the Perna and Thomas model of postsecondary student success as the conceptual framework for this study as shown in Figure 1. Academic preparation within the first transition of College Readiness was represented by the three CCR indicators selected for inclusion within the study (exam scores, accelerated secondary coursework, and CTE credits). College choice, from the second transition, measured enrollment at 2- or 4-year IHE within the first 2 years after high school graduation. The postsecondary resiliency outcome of continued IHE enrollment was associated with persistence within the third transition of College Achievement. Lastly, from the fourth transition, students who earned an industry certificate, an associate degree, or bachelor degree within two years of high school graduation represented educational attainment.

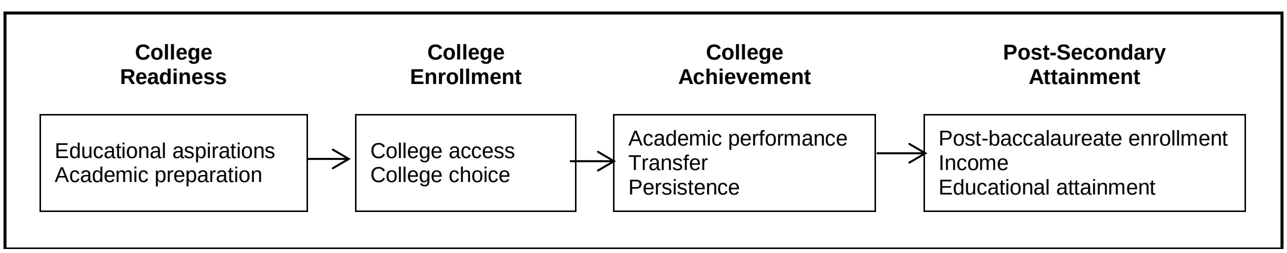

Figure 1. Key transitions and indicators of postsecondary student success. Adapted from "A Framework for Reducing the College Success Gap and Promoting Success for All," by L. Perna and S. Thomas, 2006, *National Symposium on Postsecondary Student Success: Spearheading a Dialog on Student Success*, p. 5. Reprinted with permission.

Population and Sample

Targeted for the study were 803 Hispanic high school graduates from five high schools within a single Texas public school district. The district was a minority-majority, urban school district with an enrollment of over 26,000 students in 2014. The district served students from early childhood education and Pre-K through 12th grade in the North Texas area. Hispanic student population (n = 14,456) represented 55.3% of the district's overall ethnic distribution and 49.8% (n = 803) of the graduating class (N = 1,641). Across the district, 64.7% of the students were identified as economically disadvantaged based on free/reduced lunch program participation (n = 16,918) with students being served by Title I program in 34 out of 36 schools. Additional demographical data descriptive of the district include student representation in Bilingual/ELL programs at 27.7% (n = 7,233), CTE at 19.6% (n = 5,137), special education at 9.3% (n = 2,435), and 7.8% of students (n = 2,041) identified for gifted and talented services (G/T).

From the state's accountability report (Texas Education Agency, 2015a), student composition by race/ethnicity for the district's 2014 graduating class (N = 1,641) was 11.3% Asian (n = 185), 13.7% African-American (n = 225), 22.5% White (n = 370), and 49.8% Hispanic (n = 803). As research participants consisted solely of Hispanic students from this cohort, the initial sample group represented slightly less than half of the graduates for the district. Table 1 profiles the composition of Hispanic graduate participants included within this study (n = 803) of which 48.1% were male (n = 386) and 51.9% female (n = 417).

Students identified as economically disadvantaged were 77.5% (*n* = 622) and students identified for the G/T program were 9.2% (*n* = 74). Composition of those graduates meeting the CCR criteria (*n* = 657) was 45.8% male (*n* = 301) and 54.2% female (*n* = 356) of which 76.9% (*n* = 505) were economically disadvantaged. G/T students (*n* = 71) represented 10.8% of Hispanic CCR graduates in 2014.

Table 1

Composition of Hispanic Cohort 2014 Graduates

	Total Graduates (n = 803)		CCR Graduates (*n* = 657)	
	%	#	%	#
Gender				
Male	48.1	386	45.9	301
Female	51.9	417	54.1	356
Free/Reduced				
Non-participant	22.5	181	23.2	152
Participant	77.5	622	76.8	505
Gifted and Talented				
Non-participant	90.8	729	89.2	586
Participant	9.2	74	10.8	71

Note. Profile of high school graduates from Texas public school district in the study.

Instruments

CCR indicators included in the study were those identified within the Texas educational accountability system for public schools. At the time of the study, CCR was a measurement of high school graduates meeting any one of three postsecondary readiness targets as shown in Figure 2. One CCR option was earning a minimum qualifying score on exit-level state assessments or college entrance exams in reading and mathematics. To qualify as a CCR graduate based on exam performance, a student must have met a Texas Success Initiative (TSI) benchmark score on either exit-level TAKS exam or a national college-readiness exam (SAT/ACT) in both reading and mathematics.

Number of annual high school graduates who met TSI criteria
in both reading/ELA and mathematics

Exit-Level TAKS (spring 2013 only)		SAT (Class of 2014)		ACT (Class of 2014)
=2200 scale score on ELA and a “3” or higher on essay	or	=500 on critical reading and >=1,070 total	or	>=19 on English and >=23 composite
=2200 scale score on mathematics	or	=500 on mathematics and >=1,070 total	or	>=19 on mathematics and>=23 composite

-------------- divided by --------------

Number of 2013-14 annual graduates

Figure 2. TSI criteria. Adapted from “Postsecondary Component – College and Career Readiness” by Texas Education Agency, *2015 Accountability Manual for Texas Public School Districts and Campuses*, p. 166. Copyright 2015 by the Texas Education Agency.

Exit-level TAKS exams were offered free of charge to the students at their respective schools. Participants had multiple opportunities to meet the CCR exam requirements based on the state assessment. However, neither the SAT nor the ACT was offered free of charge to students within the school district. As a result, out-of-pocket costs associated with two out of the three qualifying benchmark CCR exams were a limitation to the study.

Nevertheless, exam performance was only one method in which high school students could graduate with CCR designation. Alternate methods included secondary course participation through advanced level or CTE classes. To qualify under the second CCR indicator, students had to earn credit in at least two advanced level courses at any point during their junior and senior year of high school. Advanced level courses included Advanced Placement (AP) and International Bachelorette (IB) as well as dual credit. Participants who enrolled in a coherent sequence of CTE courses also qualified as CCR graduates. To meet this criterion, students completed two or more CTE courses earning three or more high school credits prior to high school graduation.

Methods

This investigation was a quantitative analysis of secondary academic performance and participation choices of Hispanic students within a single Texas public school district. As a form of post-hoc, non-experimental research, I examined the association between Hispanic postsecondary enrollment and resiliency outcomes based on the Texas accountability system's definition of college and career readiness.

Data Collection

As a member of the central office administrative staff assigned to the data and technology division of curriculum and instruction, I secured permission to access the assessment and accountability records for the purpose of data analysis. With school district consent, I collected 3 years of longitudinal student-level assessment and course enrollment data from the Performance Reporting Division of Texas Education Agency (TEA) and the National Student Clearinghouse (NSC) Student Tracker Academic Reports for High Schools.

I compiled all student information within a single Excel workbook through the six-digit identification number locally assigned by the school district to each student. I then cross-matched TEA student graduation records with NSC college enrollment records through an Excel-based V-LOOKUP formula using local student ID and social security number or state assigned ID. To ensure student confidentiality was maintained through the masking of data, participants were assigned a unique code ranging from 1 to 803 tied to their locally assigned school number. For the purposes of this study, I collected the following data on each participant:

a) met CCR indicator in both reading and mathematics based on qualifying college ready exam score;
b) met CCR indicator by completing and earning credit for two or more advanced level courses during any of the last 2 years of high school;
c) met CCR indicator by enrolling in a CTE coherent sequence of courses for three or more high school course credits as part of a 4-year plan of study;
d) met more than one of the CCR graduate indicators.

I then established postsecondary enrollment patterns and college persistence rates through the NSC database and reporting service. NSC reports college enrollment patterns utilizing the district's local student identification number. I matched student participation based on CCR indicators from TEA with NSC postsecondary enrollment data. Since the data originated from TEA's graduation records for the school district there were no missing data fields included in this study. A student either had a record of postsecondary enrollment or not. Figure 3 depicts subject flow through the study and data collection points.

During Year 1 of the study, postsecondary enrollment included 285 students. During the second year, postsecondary enrollment included 303 students. In total, 365 students enrolled in IHE within 2 years of high school graduation of which 21.9% (*n* = 80) entered college following a "gap year." No record of IHE enrollment existed for 54.5% (*n* = 438).

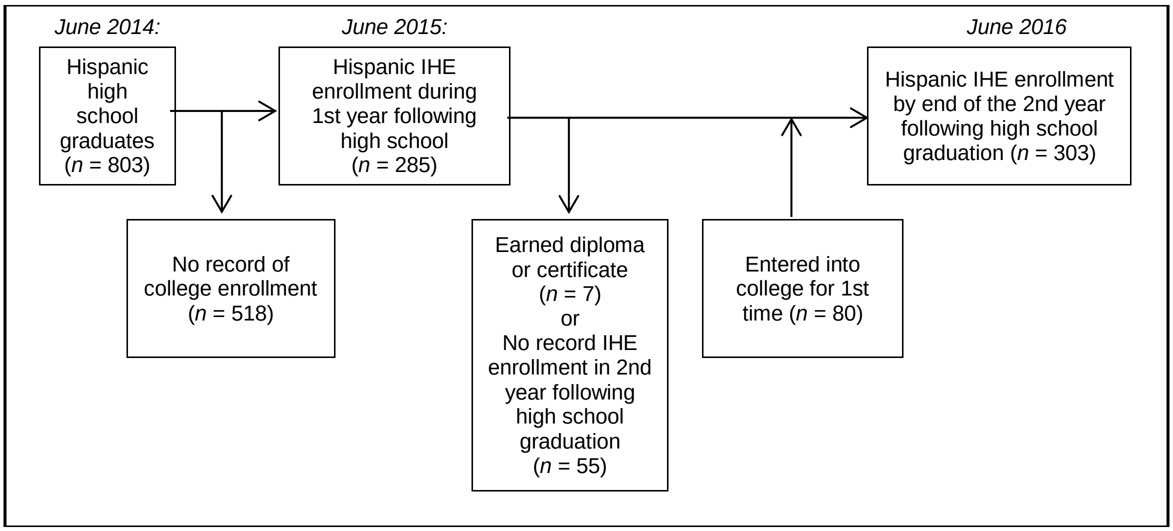

Figure 3. Subject flow through the study.

Assumptions

Beyond the control of the researcher was the mobility of students within a public school setting. I assumed the students had access to a minimum of 1 year of high school coursework in Texas. Furthermore, it was assumed the transcript information related to advanced and AP/IB course completion was recorded correctly by personnel at the five high schools prior to submission to Texas Education Agency (TEA). Additionally, I assumed students identified their high school during the self-registration process for SAT and ACT exams. Lastly, I assumed student identification numbers provided to TEA were accurately matched by other organizations to report academic performance and participation correctly for those high school graduates within the cohort selected.

Procedures

Being a non-experimental study, neither the independent nor the dependent variables were manipulated as they had already occurred. For the RQ1 (Is there a statistically significant difference in postsecondary enrollment between Hispanic high school graduates identified as college and career ready and non-CCR graduates?), the independent variables of interest was group membership comprised of non-CCR high school graduates and high school graduates who met one or more of the CCR indicators. I defined the first research question's outcome, or dependent variable, of postsecondary enrollment as enrollment in IHE coursework at any time during the first or second year immediately following high school graduation. The independent variable for RQ2 (Is there a statistically significant difference in postsecondary enrollment between Hispanic males and Hispanic females identified as college and career ready and non-CCR graduates?) became group membership of non-CCR high school graduates and CCR graduates by gender. The second research question's outcome, or dependent variable, remained postsecondary enrollment as previously defined.

For RQ3 (Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates?), the independent variable was defined by type of CCR indicator. The outcome, or dependent variable of postsecondary resiliency, was continued enrollment in IHE or the earning of industry certificates/college degrees within 2 years following high school graduation. Lastly, for RQ4 (Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates at 2-year and 4-year institutes of higher education?), I examined persistence in postsecondary education based on the type of IHE initially attended by a Hispanic high school graduate. While the dependent variable remained postsecondary resiliency, the independent variable became the type of postsecondary education initially attended by a Hispanic high school graduate in terms of 2-year or 4-year IHE and CCR indicator.

Data Analysis

To test the likelihood of postsecondary participation, I used chi-square tests of independence for all hypotheses. Researchers commonly select chi-square “to explore the relationship between two categorical variables” (Pallant, 2013, p. 225). As a nonparametric test of significance, it allows for meaningful comparison between observed differences and expected frequencies for the variables selected (Gay, Mills, & Airasian, 2012). Within this study, the outcome event was nominal (categorical) in that it either occurred, e.g., student entered into IHE, or did not. Likewise, the independent variables of CCR, gender and IHE were both mutually exclusive thereby categorical data. Within SPSS, the test statistics table reports chi-square values in terms of degrees of freedom, *p* values, expected counts in comparison to observed counts, as well as, the percentage of actual participant counts for the observed data (Pallant, 2013). Upon the approval by the University of North Texas Institutional Review Board, I used SPSS 22 to calculate descriptive statistics under the crosstabs procedures.

To conduct the study I used four separate chi-square tests of independence with the same sample population from a 2014 cohort of high school graduates. For RQ1 I hypothesized Hispanic high school graduates identified as CCR were more likely to enroll in postsecondary education. I tested the likelihood of postsecondary enrollment with a 2 x 3 chi-square test of independence. As depicted within Figure 4, the independent variable of interest was group membership comprised of non-CCR high school graduates and high school graduates who met one or more of the CCR indicators. The outcome, or dependent variable, of postsecondary enrollment for RQ1 was enrollment in IHE coursework at any time during the first or second year immediately following high school graduation.

		Postsecondary Enrollment (dependent variable)		
		Did not enroll at IHE	Enrolled at 2-year IHE	Enrolled at 4-year IHE
CCR Indicator (independent variable)	Non-CCR			
	CCR graduate			

Figure 4. Diagram of 2 x 3 contingency table of Hispanic enrollment at an institute of higher education by college and career readiness indicator.

For RQ2, I hypothesized CCR was associated with differences in postsecondary enrollment for Hispanic male and female high school graduates. For the second chi-square test, the independent variable of interest remained group membership comprised of non-CCR high school graduates and high school graduates who met one or more of the CCR indicators. With the addition of gender as an independent variable, I generated a 4 x 3 contingency table. Postsecondary enrollment remained the outcome, or dependent variable as shown in Figure 5.

		Postsecondary Enrollment (dependent variable)		
		Did not enroll at IHE	Enrolled at 2-year IHE	Enrolled at 4-year IHE
CCR Indicator (independent variable)	Non-CCR male			
	Non-CCR female			
	CCR male			
	CCR female			

Figure 5. Diagram of 4x3 contingency table of Hispanic enrollment at an institute of higher education by college and career readiness indicator and gender.

Next, to provide insight as to whether an accountability indicator related to postsecondary resiliency, I hypothesized CCR indicators predicted differences in persistence in postsecondary education for Hispanic high school graduates. I tested the likelihood of postsecondary resiliency with an 8 x 2 chi-square test of independence as shown in Figure 6. The independent variable for RQ3 was type of CCR indicator.

		Postsecondary Resiliency (dependent variable)	
		Did not meet	Met
CCR Indicator (independent variable)	Non-CCR graduate		
	CCR by exam		
	CCR by course		
	CCR by CTE		
	CCR by exam + CCR by course		
	CCR by course + CCR by CTE		
	CCR by exam + CCR by CTE		
	CCR by exam + CCR by course + CCR by CTE		

Figure 6. Diagram of 8x2 contingency table of Hispanic persistence in postsecondary education by type of college and career readiness indicator.

Since a student could meet all, some, or none of the reported CCR indicators, I classified participants into one of eight independent variable categories.

1. non-CCR participants;
2. students identified as only meeting the college readiness exam score;
3. students who only earned credit for at least two advanced/dual enrollment courses;
4. students who only enrolled in a CTE coherent sequence of courses as part of a 4-year plan of study taking two or more CTE courses for three or more high school credits;
5. students who met the college readiness score and earned credit for advanced/dual enrollment;
6. students who earned credit for advanced/dual enrollment and participated in coherent sequence of CTE high school courses;
7. students who met the college readiness score and participated in coherent sequence of CTE high school courses; or
8. students who met all three postsecondary CCR indicators.

I defined the outcome of postsecondary resiliency as students who demonstrated continued enrollment at an IHE or persisted to completion with a certification or diploma within the first 2 years following high school graduation.

As an academic school year is an arbitrary timeframe established by an independent organization to identify the beginning and ending of an instructional period required to meet course credit, various IHE offer multiple semesters of course study. Typically, 2-year and 4-year public IHE in Texas enroll students utilizing a fall, spring, and summer pattern. However, within these common enrollment cycles, students may also have an opportunity to complete a course on an accelerated pace within 9 weeks during fall or spring semesters. Summer options could include mini-May, or 3 week courses, as well as short-term, 6 week and long-term, 12 week courses. Furthermore, many IHE now offer online and hybrid courses where students can complete course credit at their own pace within a designated timeframe of 3 to 12 weeks.

For the purposes of this study, I defined an academic school year in terms of fall and spring semesters. Fall semester postsecondary enrollment was enrollment at an IHE with a beginning date of August through September and an ending enrollment date between October and December of the same calendar year. Spring semester postsecondary enrollment had a beginning date between January and February with an ending enrollment date of March through May. Students wishing to either accelerate their degree plan or improve grade point averages with grade replacement options usually complete student enrollment in summer coursework. Since the focus of the research questions was continued enrollment in IHE leading to industry certificate or diploma, I excluded summer enrollment at IHE. Subsequently, a student could meet the criteria for postsecondary resiliency by:

1. enrolling in IHE during the fall semester of 2014 and returning for one or more semesters during the 2015-16 academic school year;
2. enrolling in IHE during the spring semester of 2015 and returning for one or more semesters during the 2015-16 academic school year;
3. enrolling in IHE during the fall semester of 2015 and returning for the spring semester of 2016;

4. enrolling in IHE within the first year after high school graduation and earning an industry certification, 2-year degree, or 4-year degree by spring semester of 2015;
5. enrolling in IHE within the first year after high school graduation and earning an industry certification, 2-year degree, or 4-year degree during the 2015-16 academic school year; or
6. enrolling in IHE within the second year after high school graduation and earning an industry certification, 2-year degree, or 4-year degree during the 2015-16 academic school year.

Lastly, to test RQ4, I hypothesized Hispanic high school graduates who initially enroll in a 2-year institute of education are more likely to demonstrate characteristics of postsecondary resiliency. In this fourth chi-square test of independence, I tested the likelihood of postsecondary resiliency with a 4 x 2 contingency table. The dependent variable remained postsecondary resiliency. The independent variable became the type of postsecondary education initially attended by a Hispanic high school graduate in terms 2-year or 4-year IHE and their CCR designation as shown in Figure 7.

		Postsecondary Resiliency (dependent variable)	
		Did not meet	Met
Postsecondary Enrollment (independent variable)	Non-CCR at 2-year IHE		
	Non-CCR at 4-year IHE		
	CCR at 2-year IHE		
	CCR at 4-year IHE		

Figure 7. Diagram of 4x2 contingency table of Hispanic persistence in postsecondary education by type of institution of higher education.

Results

Results of the study are presented in two sections: a) descriptive analysis, and b) chi-square analysis. The first section includes inferential statistics to describe where similarities and differences existed across each of the CCR indicators. The second section reports the findings of four separate chi-square tests of independence. To conduct the study, I collected 3 years of longitudinal student-level test scores and enrollment records from five high schools within the same North Texas area school district. Research participants consisted solely of Hispanic graduates from the 2014 cohort representing 48.9% of the total number of students (N = 1,641) from the graduating class.

To be included, participants either had state exam data on file with the Texas Education Agency (TEA) or reported their enrollment at one of the district's high schools during self-registration for a college entrance exam (SAT/ACT). Additionally, by using local or state identification numbers issued to each student, I gathered and matched postsecondary enrollment records from NSC, an outside organization. Therefore, it is important to note that the findings in this study do not describe the total CCR levels of all students in the district, but rather those who meet the selection and matching criteria.

Descriptive Analysis

Overall Population

Frequency statistics for participants included in the study reveal males slightly outpaced females in the area of non-CCR graduates and females slightly outpaced males with regard to CCR graduates; of which, differences existed between gender groupings by more than 7 percentage points as shown in Table 2. Males comprised 58.2% (n = 85) of non-CCR Hispanic graduates and 10.6% of the overall sample. In comparison, females (*n* = 61) represented 41.8% of non-CCR Hispanic graduates and 7.6% of overall sample. With regard to CCR graduates, Hispanic males (*n* = 301) represented 45.8% of CCR sub-group or 37.5% of the sample population. CCR females (*n* = 356) represented 54.2% and 44.3% respectively.

Table 2

Frequency Statistics for Participant Demographics

Independent Variables	Dependent Variables					
	Total Sample Group (*n* = 803)		Non-CCR Group (*n* = 146)		CCR Group (*n* = 657)	
	%	Obs.	%	Obs.	%	Obs.
Gender						
Male	48.1	386	58.2	85	45.8	301
Female	51.9	417	41.8	61	54.2	356
Free/Reduced						
Non-participant	22.5	181	19.9	29	23.1	152
Participant	77.5	622	80.1	117	76.9	505
Gifted and Talented						
Non-participant	90.8	729	97.9	143	89.2	586
Participant	9.2	74	2.1	3	10.8	71

Note. Obs. = observed frequency counts.

Within the total sample group, 77.5% (*n* = 622) were identified as economically disadvantaged through participation in the free/reduced lunch program. Similarly a large majority of the same students within the non-CCR group (80.1%, *n* = 117) and CCR group (76.9%, *n* = 505) identified as economically disadvantaged. Within this same student population, overall 9.2% (*n* = 74) participated in the gifted and talented (G/T) program overall representing 2.1% (*n* = 3) of non-CCR graduates and 10.8% (*n* = 71) CCR graduates.

Overall, 45.5% (*n* = 365) attended an institute of higher education (IHE) within 2 years of high school graduation. In terms of gender, females (53.8%, *n* = 197) slightly outpaced males (46.2%, *n* = 168) in postsecondary enrollment. Students participating in free/reduced program comprised a large majority of both IHE student groups with 81.7% low-income non-IHE participants (*n* = 358) and 71.6% low-income IHE enrollee group (*n* = 264). Hispanic G/T students comprised 13.5% of IHE enrollees (*n* = 50). Whereas a majority of G/T Hispanics enrolled in IHE, there was no record of IHE enrollment for 32.4% of Hispanic G/T students (*n* = 24) comprising 5.5% of non-IHE participants.

With regard to postsecondary resiliency, overall 67.4% (*n* = 246) persisted in IHE through continued enrollment or completion by earning a diploma or industry-certification within 2 years. In terms of gender, females (54.5%, *n* = 134) slightly outpaced males (45.5%, *n* = 112). With regard to socio-economic status, participants in free/reduced lunch program were represented similarly across the total sample group (72.3%, *n* = 264), participant group failing to persist (75.6%, *n* = 90), and participant group of those who did return to IHE (70.7%, *n* = 174). Throughout the course of this study, seven students persisted to completion within 1 year following high school graduation by earning an industry certification (*n* = 4), 2-year degree (*n* = 2), or 4-year diploma (*n* = 1). At the close of the study, a total of 16 students persisted to completion within 2 years following high school graduation by earning an industry certification (*n* = 7), 2-year degree (*n* = 6), or 4-year diploma (*n* = 3).

Next, to provide a more descriptive analysis of the CCR characteristics attributed to Hispanic high school graduates, I categorized students based on the number of CCR indicators met which yielded four distinct classifications. The first grouping was students who did not meet any of the possible indicators identified as non-CCR graduates. The second grouping was students who met only one of the CCR indicators, e.g., college readiness qualifying exam score, credit for at least two advanced/dual enrollment courses, or enrollment in a CTE coherent sequence of courses. The third grouping was students who met any two of the CCR indicators. Lastly, the fourth group was comprised of students who met all three postsecondary CCR indicators.

Non-CCR Hispanic High School Graduates

Non-CCR graduates comprised 18.2% (*n* = 146) of the overall population (*n* = 803). While non-CCR graduate enrollment in IHE (*n* = 45) represented 5.6% of the overall sample, they accounted for 12.3% of Hispanic enrollment in IHE. Yet, fewer than half (*n* = 21) demonstrated postsecondary resiliency. More Hispanic males than Hispanic females comprised the non-CCR group (*n* = 146). Whereas females represented 41.8% (*n* = 61) of non-CCR graduates, they accounted for 7.6% of the overall sample group. In comparison, males represented 58.2% (*n* = 85) of non-CCR graduates accounting for 10.6% of the overall sample. A large majority of non-CCR students, 80.3% (*n* = 118) identified as economically disadvantaged. They accounted for 19.0% of all free/reduced participants (*n* = 622). Only 2% (*n* = 3) of non-CCR graduates participated in the G/T program.

Hispanic CCR Graduates Meeting a Single CCR Indicator

Over a third of participants met at least one of the CCR indicators (34.5%, *n* = 277). Males at 35.5% (*n* = 137) and females at 33.6% (*n* = 140) were represented similarly within this category. Yet, slight differences existed between genders in terms of type of CCR indicator. Females completed advanced courses at a higher rate (12.7%, *n* = 53) than males (9.6%, *n* = 37). Conversely, males completed CTE coursework at a higher rate (19.2%, *n* = 74) than females (17.0%, *n* = 71). With regard to participation in a free/reduced lunch program, socio-economic status had little bearing for students meeting only one of the CCR indicators. Participants (34.4%, *n* = 214) and non-participants (34.3%, *n* = 62) each represented a third of their respective sub-groups.

Hispanic CCR Graduates Meeting Two CCR Indicators

Females comprised 36.9% (*n* = 154) of this category compared to 30.6% (*n* = 118) for males. This was primarily due to their slightly elevated representation for students meeting the qualifying exam score combined with the completion of advanced courses. There was relatively little difference between these same CCR student groups with regard to participation in a free/reduced lunch program. Similar to CCR graduates meeting a single indicator, those meeting two CCR indicators also represented a third of their respective sub-groups. Free/reduced participants were 35.4% (*n* = 64) while non-participants were at 33.4% (*n* = 208).

Hispanic CCR Graduates Meeting All Three CCR Indicators

Students who met all three postsecondary CCR indicators accounted for the fewest Hispanic high school graduates (13.4%, *n* = 108). Females slightly outpaced males by three percentage points 14.9% (*n* = 62) to 11.9% (*n* = 46) respectively. Once again, socio-economic status had relatively little bearing on students designated as meeting all three CCR indicators with participants at 13.2% (*n* = 82) and non-participants in free/reduced lunch program accounting for 14.4% (*n* = 26).

In summary, more Hispanic females 85.5% (n = 356) than Hispanic males 78.0% (n = 301) met at least one CCR indicator. Males were more likely to represent non-CCR graduates 22.0% (n = 85) in comparison to females 14.6% (n = 61). Hispanic males were also more likely to represent CCR graduates with only one indicator (35.5%, n = 137) versus females (33.6%, n = 140) largely due to their participation in CTE (19.2%, n = 74). Hispanic females were more likely to represent CCR graduates with two indicators (36.9%, n = 154) largely due to the combination of qualifying exam scores and advanced coursework at 24.2% (n = 101). Furthermore, Hispanic females were slightly more likely to graduate with all three CCR indicators at 14.9% (n = 62) as compared to Hispanic males at 11.9% (n = 46). Lastly, there was less than a 3-percentage point difference between free/reduced program participants and non-participants in all categorized CCR graduate student groupings.

Chi-Square Analysis

To test the likelihood of postsecondary participation I conducted four separate chi-square tests of independence using the same sample population from a 2014 cohort of high school graduates. I reported chi-square analysis in two sections based on the research questions: likelihood of postsecondary enrollment with RQ1 and RQ2; and likelihood of postsecondary resiliency with RQ3 and RQ4. Chi-square test of independence is a nonparametric test of significance often referred to as chi-square test of association. It compares the observed frequency counts to the expected frequency count if there was no association between the independent and dependent variables:

> As the expected frequencies are predicted on there being no association, the greater the association between the two nominal variables, the greater you would expect the observed frequencies to differ to the expected frequencies. The converse is also true. The less the two nominal variables are associated, the

> closer the observed frequencies will be to the expected frequencies. (Laerd Statistics, 2017, para. 1)

Chi-square tests inform researchers of the likelihood of association between variables. On their own, chi-square tests do not provide information as to the strength of association. To conduct effect size statistics, I used Cramér's phi coefficient, Cramér's φ, to provide a strength-of-relationship index for all chi-square tests.

Likelihood of Postsecondary Enrollment

I tested the likelihood of enrollment at IHE with the first two research questions. For RQ1, I hypothesized Hispanic high school graduates identified as CCR were more likely to enroll in postsecondary education. I tested the likelihood of postsecondary enrollment with a 2x3 chi-square test of independence. The independent variable of interest was group membership comprised of non-CCR high school graduates and those who met one or more of the CCR indicators. The dependent variable was enrollment in IHE coursework at any time during the first or second year immediately following high school graduation. For RQ2, I hypothesized CCR was associated with differences in postsecondary enrollment for Hispanic male and female high school graduates. With the addition of gender as an independent variable, I generated a 4x3 contingency table with postsecondary enrollment remaining the outcome, or dependent variable.

Chi-square analysis of postsecondary enrollment for Hispanic high school graduates by college and career readiness. The contingency table of observed and expected frequencies for the postsecondary enrollment for 803 Hispanic high school graduates in terms of CCR is depicted in Table 3. With the degree of freedom associated at 2 and the level of significance (α) set at .05, the critical value of the test statistic ($x^2{}_{cv}$) for the first contingency table was established as 5.991. Because the computed x^2 value (21.49) exceeds the critical value ($x^2{}_{cv}$ = 5.991), I failed to reject the hypothesis for RQ1. There was a statistically significant association between Hispanic high school graduate CCR and postsecondary enrollment, $x^2(2) = 21.49$, $p < .001$.

Table 3

Comparison of Residuals for Type of High School Graduate and IHE Enrollment

Independent Variable	Postsecondary Enrollment (DV)						Total
	Did not enroll IHE		Enrolled 2-year IHE		Enrolled 4-year IHE		
	Obs.	Exp.	Obs..	Exp..	Obs..	Exp..	
Non-CCR Graduate	101	79.6	35	37.8	10	28.5	146
CCR Graduate	337	358.4	173	170.2	147	128.5	657
Total	438		208		157		803

Note. Observed counts (Obs.) and expected frequency counts (Exp.) identified within 4x3 contingency table.

To investigate the statistical significance of the first chi-square test results, I then generated a cross-tabulation table within SPSS 22. Adequate sample size was met with no cells having an expected count less than 5. The outcome of the chi-square test statistic reported in Appendix G found the observed distribution of Hispanic high school students by CCR (IV) and postsecondary enrollment (DV) were not equal in the sample, $x^2 = 21.987$, $p < .001$. Using Cohen's criteria, Cramér's φ = .165 falls between a small and moderate correlational measure of effect size (Cohen, Lea, & Welkowitz, 2011).

Next, I used two approaches available within SPSS to determine if one of the independent variables was a major contributor to the statistically significant x^2 value. The first approach was residual analysis; the second was a z-test of two proportions.

Residuals are the differences between observed and expected values; “the larger the residual, the greater the contribution of the cell to the magnitude of the resulting chi-square obtained value” (Sharpe, 2015, p. 2). A closer examination of cell-by-cell calculation of cases determines which cells account for the greater source of statistical significance.

Analysis of residuals, or a cell-by-cell comparison, allows researchers to identify cells with a large absolute adjusted standardized residual indicating where the lack of independence is occurring within the cross-tabulations (Laerd Statistics, 2017). SPSS reports the different calculations for residuals. Raw residuals, labeled simply as ‘Residuals’ in SPSS output, are “the product of subtracting expected from observed values” (Sharpe, 2015, p. 3). Whereas a standardized residual greater than +/- 2.0 can identify major contributions to significant chi-square value (Hinkle, Wiersma, & Jurs, 2003), “according to Agresti (2007) . . . adjusted standardized residuals ‘having an absolute value that exceeds about 2 when there are few cells or about 3 when there are many cells indicates lack of fit in that cell’” (as cited in Sharpe, 2015, p. 3).

Based on the recommendations for analyzing calculated residuals (Agresti, 2007 as cited in Sharpe, 2015; Delucchi, 1993; Thompson, 1988), I identified cells with the largest residual at an adjusted standardized absolute value of +/-3.0. As designated, those cells were associated with having the greater discrepancy, i.e., contribution, than expected within the x^2 obtained value. Residual analysis for the first chi-square test indicated two categories with the greatest discrepancy in differences between observed and expected counts for Hispanic postsecondary enrollment: (a) students who did not enroll at an IHE and (b) students who enrolled in a 4-year IHE. More non-CCR graduates and fewer CCR graduates did not enroll in a postsecondary IHE than expected. Conversely, fewer non-CCR graduates and more CCR graduates enrolled in a 4-year IHE than expected.

Next, to evaluate which of the independent variable groups differed in terms of postsecondary enrollment, I also conducted a post-hoc test that included pairwise comparisons with Bonferroni correction. The z-test of two proportions tests all pairwise comparisons between the independent variable groups to determine whether specific cells differed from each other. The Bonferroni adjustment reduces risk of Type I error by making corrections for multiple comparisons run on the same data set. In doing so, a new alpha (α) level is calculated with the adjusted alpha level = original alpha level/number of comparisons (Laerd Statistics, 2017). With three sets of comparison for each independent variable in RQ1, an adjusted alpha was calculated at .05/3 for the first post hoc test and set at $\alpha = .017$.

SPSS uses subscripts to designate if differences are statistically significance for each pairwise comparison at the adjusted alpha level. Using z-tests of two proportions with a Bonferroni correction, postsecondary enrollment differed significantly for both non-CCR graduates and CCR graduates. The adjusted alpha level of $p < .017$ was met in four out of six pairwise comparisons for RQ1. Post-hoc analysis of the first chi-square test of independence reveals statistically significant differences existed between non-CCR graduates who did not enroll in IHE and those who enrolled in 4-year IHE ($n = 101$, 23.1% versus $n = 10$, 6.4%). Likewise, statistically significant differences existed between non-CCR graduates who enrolled in 2-year IHE and those who enrolled in 4-year IHE ($n = 35$, 16.8% versus $n = 10$, 6.4%).

Similarly, statistically significant differences existed between CCR graduates who did not enroll in IHE and those who enrolled in 4-year IHE (*n* = 337, 76.9% versus *n* = 147, 93.6%) as well as CCR graduates who enrolled in 2-year IHE and those who enrolled in 4-year IHE (*n* = 173, 83.2% versus *n* = 147, 93.6%). However, in this pairwise comparison, statistically significant differences did not exist between non-CCR graduates who did not enroll in IHE and non-CCR graduates attending 2-year IHE (*n* = 101, 23.1% versus *n* = 35, 16.8%). Likewise, statistically significant differences did not exist for CCR graduates who did not enroll in IHE and non-CCR graduates attending 2-year IHE (*n* = 337, 76.9% versus *n* = 173, 83.2%).

Chi-square analysis of postsecondary enrollment for Hispanic high school graduates by college and career readiness and gender. A second chi-square test of independence examined the same group of students with gender included as additional demographic variable to non-CCR and CCR graduates as shown in Table 4. All expected cell frequencies were greater than five. With *df* = 6 and α = .05, the critical value of the test statistic ($x^2{}_{cv}$) became 12.592. Chi-square statistics reported by SPSS reveal distributions were not equal in population (see Appendix G). There was statistically significant association between postsecondary enrollment and CCR by gender, x^2(6) = 24.538, *p* < .001. With Cramér's φ = .124 the effect size of association was small (Cohen et al., 2011).

In calculating residuals for RQ2, I found the largest adjusted standardized residuals were for non-CCR males and non-CCR females. For the case of non-CCR females (*n* = 2, 3.3%), less than one-sixth (16.7%) enrolled in 4-year IHE than would be expected if the relationship between postsecondary enrollment and CCR was independent. Conversely, more non-CCR males than expected did not enroll in IHE (*n* = 59, 69.4%).

Table 4

Contingency Table for Type of High School Graduate and IHE Enrollment by Gender

Independent Variable	Postsecondary Enrollment (DV)						Total
	Did not enroll IHE		Enrolled 2-year IHE		Enrolled 4-year IHE		
	Obs..	Exp..	Obs..	Exp.	Obs..	Exp..	
Non-CCR Male	59	46.4	18	22.0	8	16.6	85
Non-CCR Female	42	33.3	17	15.8	2	11.9	61
CCR Male	159	164.2	73	78.0	69	58.9	301
CCR Female	178	194.2	100	92.2	78	69.6	356
Total	438		208		157		803

Note. Observed counts (Obs.) and expected frequency counts (Exp.) identified within 4x3 contingency table.

Multiple z-tests for two proportions with a Bonferroni correction revealed there was not a statistically significant association between CCR males and postsecondary enrollment. However there was a statistically significant difference between non-CCR female enrollment in 4-year IHE (*n* = 2, 3.3%) and those who did not enroll (*n* = 42, 68.9%) or enrolled in 2-year IHE (*n* = 17, 27.9%). There was also statistically significant differences between non-CCR males who did not enroll and those enrolled in 4-year IHE (*n* = 59, 69.4% versus *n* = 8, 9.4%) as well as CCR females who did not enroll and those enrolled in 4-year IHE (*n* = 178, 50% versus *n* = 78, 21.9%).

Likelihood of Postsecondary Resiliency

I tested the likelihood of postsecondary resiliency with the last two research questions. For RQ3, I hypothesized CCR indicators predicted differences in persistence in postsecondary education for Hispanic high school graduates. I tested the likelihood of postsecondary resiliency with an 8x2 chi-square test of independence. The independent variable of interest for RQ3 was type of CCR indicator. Since a student could meet all, some, or none of the reported CCR indicators, I classified participants into one of eight independent variable categories. The dependent variable was continued enrollment at an IHE or persistence to completion with a certification or diploma within the first 2 years following high school graduation.

For RQ4, I hypothesized Hispanic high school graduates who initially enroll in a 2-year IHE are more likely to demonstrate characteristics of postsecondary resiliency. I tested the likelihood of postsecondary resiliency with a 4x2 contingency table. The dependent variable remained postsecondary resiliency; however, the independent variable became the type of postsecondary education initially attended by a Hispanic high school graduate in terms 2-year or 4-year IHE and their CCR designation.

Chi-square analysis of postsecondary resiliency for Hispanic high school graduates by college and career readiness. The contingency table of observed and expected frequencies for the 365 students who enrolled in IHE within the first 2 years following high school graduation is depicted in Table 5. One cell, or 6.3% of the contingency table, had an expected count of less than 5. Older studies have followed Fisher's (1925) rule that only contingency tables with "no cells with expected frequencies less than five" can be included in chi-square analysis (as cited in Sharpe, 2015, p. 8). Delucchi (1993) as well as Ruxton and Neuhauser (2010) argue Cochran's revised recommendation for strengthening the common chi-square tests in 1954 is a more sufficient rule of thumb for minimum size. Subsequently, it has become more common to follow a minimum sample size requirement of no cells having expected frequencies less than 1 with no more than 20% of the cells having expected frequencies of 5 or less (Laerd Statistics, 2017; Sharpe, 2015). Thus, it can be determined the minimum size requirement was met for RQ3 chi-square analysis. Furthermore, all cells met the minimum expected count of 3.91.

Table 5

Contingency Table for Persistence in Postsecondary Enrollment by Type of CCR Graduate

	Postsecondary Resiliency (DV)				
	Did Not Meet		Met		
Independent Variable	Obs.	Exp..	Obs..	Exp.	Total
Non-CCR Graduate	24	14.7	21	30.3	45
CCR Graduate w/1 Indicator					
Exam	7	3.9	5	8.1	12
Courses	16	13.7	26	28.3	42
CTE	20	11.7	16	24.3	42
CCR Graduate w/2 Indicators					
Exam + Courses	23	38.5	95	79.5	118
Courses + CTE	4	7.8	20	16.2	24
Exam + CTE	10	6.8	11	14.2	21
CCR Graduate w/3 Indicators					
Exam + Courses + CTE	15	21.8	52	45.2	67
Total	119		246		365

Note. Observed counts (Obs.) and expected frequency counts (Exp.) identified within 8x2 contingency table.

With *df* = 7 and α = .05, the critical value of the test statistic ($x^2{}_{cv}$) was established at 14.067. The outcome of the chi-square test statistic reported in Appendix G found the observed distribution of Hispanic high school students by CCR type and postsecondary resiliency were not equal in the sample, $x^2(7)$ = 38.967, *p* < .001. Since the computed x^2 (38.967) exceeded the critical value ($x^2{}_{cv}$ = 14.067), I failed to reject the hypothesis for RQ3. There was a statistically significant association between type of CCR indicators and postsecondary resiliency. The Cramér's φ coefficient value was .327, or a medium effect size.

The comparison of calculated residuals reported within Table E.14 of Appendix E show there was greater discrepancy than expected for CCR graduates with a combination of exam scores and advanced courses, followed closely by non-CCR graduates and CCR graduates with a CTE indicator. More students than expected by chance met the postsecondary resiliency criteria for CCR by exam and courses. Conversely, the reverse occurred for CCR graduates by CTE and non-CCR graduates. Fewer than expected Hispanic graduates with CTE coherent sequence of CCR indicators met postsecondary resiliency criteria. Likewise, fewer than expected non-CCR graduates met the postsecondary resiliency criteria.

Post hoc analysis show four out of the eight overall student groups differed significantly from each other. There were statistically significant differences between non-CCR graduates who did not meet the postsecondary resiliency criteria and those who did (*n* = 24, 53.3% versus *n* = 21, 46.7%). For CCR graduates meeting only one CCR indicator, pairwise comparisons show there were statistically significant differences between CCR graduates with the CTE indicator who did not meet the postsecondary resiliency criteria and those who did (*n* = 20, 55.6% versus *n* = 16, 44.4%).

For CCR graduates meeting two of the CCR indicators, there were statistically significant differences between CCR graduates with exam scores and advanced courses who did not persist in IHE in comparison to CCR graduates who met the postsecondary resiliency criteria (*n* = 10, 47.6% versus *n* = 11, 52.4%). Lastly, statistically significant differences existed for postsecondary resiliency for Hispanic high school graduates meeting all three CCR indicators. More than expected by chance met postsecondary resiliency criteria than not (*n* = 52, 77.6% versus *n* = 15, 22.4%).

Chi-square analysis of postsecondary resiliency for Hispanic high school graduates by type of postsecondary enrollment. The last chi-square test of independence explored the association of postsecondary resiliency and CCR based on the type of IHE in which the student initially enrolled. Table 6 depicts the contingency table of observed and expected frequencies for the 365 students who enrolled in IHE within the first two years following high school graduation in terms of type of IHE and CCR.

Table 6

Contingency Table for Type of Postsecondary Enrollment by IHE and CCR (IV) and Postsecondary Resilience (DV)

	Postsecondary Resiliency (DV)				
	Did Not Meet		Met		
Independent Variable	Obs..	Exp.	Obs.	Exp.	Total
Non-CCR at 2-year IHE	18	11.4	17	23.6	35
Non CCR at 4-year IHE	6	3.3	4	6.7	10
CCR at 2-year IHE	71	55.4	99	114.6	170
CCR at 4-year IHE	24	48.9	126	101.1	150
Total	119		246		365

Note. Observed counts (Obs.) and expected frequency counts (Exp.) identified within 4x2 contingency table.

With *df* = 3 and α = .05, the critical value of the test statistic ($x^2{}_{cv}$) was established at 7.815. Only one cell had an expected count less than 5 (12.5%), and all cells met minimum expected count of 3.26. The outcome of the chi-square test statistic reported in Appendix G found the observed distribution of students meeting postsecondary resiliency were not equal in the sample, $x^2(3) = 34.373$, $p < .001$. Since the computed x^2 (34.373) exceeded the critical value ($x^2{}_{cv} = 7.815$), there was a statistically significant association between Hispanic graduates and postsecondary resiliency outcomes based on CCR and type of IHE enrollment. The Cramér's φ coefficient value was .307, or medium effect size.

Residual analysis for last chi-square test indicated two categories with the greatest discrepancy in differences between observed and expected counts for Hispanic postsecondary enrollment: (a) CCR graduates enrolled at 2-year IHE and (b) CCR graduates enrolled at 4-year IHE. As reported within Unabridged Results of Appendix E, the comparison of calculated residuals shows those designated cells were associated with having the greater discrepancy, i.e., contribution, than expected within the x^2 obtained value 34.373.

There was greater discrepancy than expected for both categories of CCR graduates. Hispanic CCR graduates enrolled at 4-year IHE provided the greatest contribution to differences. More students than expected by chance met the postsecondary criteria for CCR graduates who initially enrolled at 4-year IHE. Fewer students than expected by chance met the postsecondary criteria for CCR graduates who initially enrolled at 2-year IHE. Likewise, fewer students than expected by chance met the postsecondary criteria for non-CCR graduates who initially enrolled at 2-year IHE. Subsequently I rejected the hypothesis for RQ4.

Post hoc analysis with z-tests of two proportions show three out of the four student groups differed significantly from each other. The only pairwise comparison in which differences were not statistically significant occurred between students meeting or not meeting postsecondary resiliency for non-CCR graduates enrolled at 4-year IHE (n = 6, 60.0% versus n = 4, 40.0%). All other pairwise comparisons were statistically significant from each other at $p < .05$ alpha level. There were statistically significant differences between non-CCR graduates at 2-year IHE who did not meet the postsecondary resiliency criteria than those who did (n = 18, 51.4% versus n = 17, 48.6%). There were also statistically significant differences between CCR graduates at 2-year IHE who did not met the postsecondary resiliency criteria and those who did (n = 71, 41.8% versus n = 99, 58.2%). Lastly, there were statistically significant differences in postsecondary resiliency outcomes for CCR graduates at 4-year IHE who did not met the postsecondary resiliency criteria than those who did (n = 24, 16.0% versus n = 126, 84.0%).

Discussion

It is well-known that a disparity exists between the percentage of students with plans to earn a bachelor degree and those who graduate with the degree. These differences are especially evident among minorities, males, and lower-income families (Holzer, Linn, & Monthly, 2013). Moreover, issues surrounding the transition from high school to college are not new. Since the onset of Head Start and ESEA in the 1960’s, the U.S. has a long history of measuring academic performance and participation.

Texas in particular has been holding schools accountable for developing postsecondary readiness in some form for over 20 years. Yet it remains well below the national average in college participation and educational attainment. The state's current educational goal is to have 60% of Texas residents aged 25-34 with an industry certificate or college degree by 2030 (Texas Higher Education Coordinating Board, 2015b). To reach this target there must be multiple academic avenues and support services for students to transition from high school to an IHE successfully.

The purpose of this study was to examine the association of college and career readiness (CCR) factors to postsecondary enrollment and resiliency outcomes for Hispanic students. I built on prior investigations through a descriptive analysis of student level academic records for a total 803 high school Hispanic graduates and the 657 who met one or more CCR indicators from the class of 2014. My interest in this area of research began with a curiosity about program options available to high school students with an intent to attend college. Of particular interest was to what extent does the state's definition of CCR reflect postsecondary readiness for a traditionally underrepresented student group such as Hispanic high school graduates? This led me to examine the various ways in which secondary schools offer students access to CCR pathways.

In this study, I examined three such academic avenues based on the state's newly defined categories of CCR with the state's accountability system. Tracking the academic talent development of students based on program placement could provide key indicators descriptive of those who participate in accelerated secondary instructional programs and demonstrate postsecondary resiliency. Building upon that knowledge, program practices and interventions could be implemented to develop higher levels of postsecondary outcomes for the district's high school graduates. Thereby, the findings of this study could guide CCR program options implemented by campus and district personnel responsible for program improvement, staff development, course offerings, and student scheduling.

Findings

Results from the study's examination of postsecondary enrollment suggest a moderately strong association exists between CCR indicators and postsecondary participation. I found evidence that differences exist among Hispanic high school graduates who enroll in IHE. More Hispanic CCR graduates enroll at 2-year and 4-year IHE than expected by chance. Additionally, statistically significant differences exist across CCR and gender. Overall, 45.5% (n = 365) attended an IHE within 2 years of high school graduation. The most telling descriptive analysis related to Hispanic female CCR graduates.

Findings from this study demonstrate Hispanic females are more likely than Hispanic males to meet CCR with a combination of advanced course completion and qualifying score on college entrance exam. This was an unexpected finding as the mean scores for Hispanic females were lower than males for each of the college-readiness exams included in this study. Hispanic females did however participate at a greater rate than males. This suggests that Hispanic females may not differ from their peers in academic interests and that misgivings or generalities may remain about student performance in high school with regard to postsecondary success factors especially when exam scores are used as a barometer.

In terms of gender, Hispanic females also outpaced males in postsecondary resiliency attributes during this time period. Overall, 67% (*n* = 246) persisted in IHE through continued enrollment or completion by earning a diploma or industry-certification within 2 years. Based on findings for postsecondary resiliency, Hispanic high school graduates with two or more CCR indicators were more likely to persist in enrollment. With regard to AP course offerings, these findings are consistent with Burney (2010). The more opportunities a student has to participate in advanced level and rigorous coursework, the greater the likelihood of predictive college success.

Conversely, Hispanic high school graduates with the single CCR indicator of CTE were less likely to meet postsecondary resiliency outcomes. As this CCR indicator comprises the highest percentage of Hispanic males within the study, it signals an area that could potentially benefit from further examination. Additionally, while non-CCR graduates enrolled in 2-year and 4-year IHE, they were less likely to meet postsecondary resiliency outcomes.

Furthermore, not only are non-CCR graduates who enroll at 2-year IHE less likely to meet the postsecondary criteria but also CCR graduates who enroll at 2-year IHE. This is especially important given a large majority of students within the district attend a 2-year IHE within the first year immediately following graduation. Additionally, the analysis shows the association between Hispanic high school graduates and postsecondary resiliency indicators based on CCR and type of IHE enrollment as having a medium effect size. Socio-economic status is often attributed as a barrier for students to enroll or stay in college. However, the percentage of participants identified as low-income were similarly represented across all sample groups as well as for those who met postsecondary resiliency outcomes (70.7%) and those who did not persist (75.6%). Subsequently funding and costs associated with postsecondary enrollment may not have played a major role for Hispanic students included in this study.

Additionally, while poor academic preparation and weak remedial programs may apply as underlying reasons for the lack of postsecondary success for non-CCR graduates, the findings suggest something else may be contributing to low completion rates for CCR graduates who initially enroll in 2-year IHE. Finally, the results of the study indicate the greatest contribution to differences in postsecondary resiliency existed for Hispanic CCR graduates who enroll at a 4-year IHE.

Implications for District

Implications for the district include an examination of CCR across cohort groups and demographics. Participants included in the study were the first cohort of high school students to graduate under these CCR accountability standards and data was gathered from only one demographic group. Thereby, the findings are limited to a single cohort within the school district and applicable to only half of their graduates. Many districts within the state struggle to provide a full range of advanced academic program options. It takes years to build the infrastructure to support the availability of advanced level courses such as AP/IB and dual credit as well as CTE courses that lead to industry certificates. Multiple components of planning along with the allocation of resources include teacher certification, master scheduling, and the alignment of course sequencing in prior grades. Prior to implementing policy changes, the study should be expanded to include all student groups. Given that participates were comprised of students from 5 high schools, consideration should also be given to include campus as a demographic field in order to explore if variance exists between schools.

Another implication for the district is student access to college-readiness exams. Prior research studies have linked an increase in qualifying scores on AP exams to removal of the exam fees (Jeong, 2009). Given that the study demonstrated socio-economic status had relatively little influence on postsecondary enrollment as well as resiliency outcomes for all CCR student groups, a contribution of the study is that when an exam score is combination with advanced or CTE coursework, students have a greater likelihood of enrolling in IHE as well as persisting in their enrollment. By eliminating the complications associated with unequal financial access, the district could potentially provide an avenue to additional students meeting the CCR indicator based on college-readiness exams such as TSI Accuplacer, SAT, or ACT. Furthermore, by providing college entrance exams free of charge to all students, the district would provide valued input on a student's readiness to begin dual credit courses or alternatively embark on college preparatory courses while in still in high school thereby eliminating the need for non-credit bearing courses in his or her first year of IHE enrollment.

Limitations and Opportunities for Future Research

Regarding future research, there is much still to be explored. Additional research interests include the association of CCR to postsecondary enrollment and resiliency over time. A limitation of the study was it traced postsecondary records for the first 2 years immediately following high school graduation. Future studies could address postsecondary outcomes at the 3-year and 6-year mark. This would allow for an examination of CCR in term of the 150% on-time graduation rule for 2-year and 4-year IHE respectively. It would also allow for a closer examination of students who entered IHE after a gap year, thereby lending support or a counterpoint to Jenkins & Cho (2012) analysis of the benefits of entering into community college within the first year after high school.

Another implication for future research includes examining the association between advanced level courses of AP/IB versus dual credit. Preparing students for postsecondary success is of national interest and policy with ESSA as well as with the state's Texas 60x30 Plan. To support these initiatives, school districts could more easily identify contributing factors associated with accelerated secondary programs if high school graduate postsecondary data files differentiated advanced level CCR course indicators. Findings from the study confirm a positive relationship between completion of advanced level courses and postsecondary resiliency. Due to the definition of advanced level courses in the state's current accountability system, the Texas Education Agency does not release to districts a state-level report of completion rates disaggregated by type of advanced level courses. Subsequently, it is difficult to ascertain the unique contribution of AP/IB courses in comparison to dual credit courses in terms of postsecondary persistence.

APPENDIX A

DEFINITION OF TERMS

Academic Achievement

In their meta-analysis on the effects of acceleration, Steenbergen-Hu and Moon (2011) defined academic achievement as indicators of academic effects predictive of probable student success. Based on conceptual and operational definitions stated previously, the outcomes of this study are categorized into secondary academic achievement levels and measures of postsecondary success. At the secondary level, high school CCR academic indicators are based on standardized test results and course completion. At the postsecondary level, college enrollment in the first year immediately following high school graduation, subsequent retention rates, and degrees/certificates earned are included as an indicator of academic achievement.

Accelerated instruction

Accelerated instructional programs act as an intervention for advanced level learners by allowing students to “progress through an educational program at rates faster or at ages younger than conventional” (Pressey, 1949). At the secondary level, curricular programs and services that go beyond standard grade-level work, such as AP/IB, or dual credit courses, are common forms of accelerated instruction.

Accountability Subset

Texas public educational schools, or local education agencies, are held accountable for students enrolled at a campus or within a district on the last Friday in October. Students enrolled at the time of the annual October snapshot date become part of the local school district and state’s accountability subset. Campus and district accountability ratings are calculated using the performance measures of those same students enrolled at the time of state and national assessments.

Advanced Placement (AP)

Designed by The College Board (2014d), the Advanced Placement (AP) program provides middle and high school students access to college-level curriculum prior to postsecondary enrollment. Most AP classes cover first-year college subject material. Students earn high school credit upon course completion. AP exams are available to students at a cost. While The College Board determines the test content and grading criteria of AP exams, colleges and universities establish cut scores for earning college credits for their respective institutes.

Career and Technology Education (CTE)

Prior to the reauthorization of the Carl D. Perkins Vocational and Technical Education Act in 2006, CTE was termed vocational education. CTE approaches high school course credit within an aligned, multi-year enrollment program. Typical areas of study are industry-certificate standards common in the fields of engineering, technology, applied science, health, public safety, education, agricultural, manufacturing, construction, and transportation.

Dual Credit

Dual credit programs allow non-high school graduates the ability to enroll in college courses and receive academic credit simultaneously for both high school and college (Miller et al., 2017). Grades and course completion credits are recorded separately on both high school and college transcripts. In Texas, costs associated with college enrollment (tuition, fees, books, and materials) are covered by the school district at no out-of-pocket cost to the student.

International Baccalaureate (IB)

The International Baccalaureate (IB) program has a curricular emphasis on international-mindedness, high standards, comprehensive and aligned exams. Instead of providing a variety of advanced level subject-specific courses to choose from, students graduate from high school under a comprehensive and cohesive 2-year diploma programme (Hertberg-Davis & Callahan, 2008). IB exams are covered by the school district at no out-of-pocket expense to the student. Similar to AP exam credit, colleges and universities establish course credit equivalency to IB graduates.

Performance Gap

Multiple works published after the implementation of NCLB (2002) legislation reveal performance rates for top-achieving students are decreasing or becoming stagnant. Determining where gaps exist at the highest level of achievement areas between various populations can help explain continued challenges faced by racially, ethnically, and linguistically diverse students. Defined as disparity “at the highest levels of achievement between students from White, affluent backgrounds and the top-performing students from minority and low-income backgrounds” (Tomlinson & Jarvis, 2014, p. 193), performance gaps have been referred to as an excellence gap. While both are acceptable as interchangeable in advanced academic publications, the term performance gap is utilized within the current investigation.

APPENDIX B

EXTENDED INTRODUCTION

Introduction

Millennials were raised during a rapidly changing technical age with curriculum founded on preparation for 21st century skills and were the first generation of classroom students with access to the Internet (Bonne, Lewis, Bowman-Perrott, Hill-Jackson, & James, 2009). These same students currently comprise the 18- to 35-year old age bracket. As such, their experiences are beginning to influence policies associated with schooling in the United States. One of the greatest and most prominent shifts has occurred in educational attainment. In 1973, less than one out of every three American workers in the labor force had some form of postsecondary education. By 2000, along with a sharp increase in high school graduation rates, postsecondary education rates had risen from 28% to 59% (Carnevale & Derochers, 2002). With the national high school graduation rate reaching 82% in 2014, a large majority of graduates (68%) enrolled in an institute of higher education (IHE) by the following October (Musu-Gillette et al., 2016).

The impact of access to educational opportunities during K-12 years is well-known and consistent with social policy reforms to close achievement gaps (Boykin & Noguera, 2011). Extensive research has found educational attainment beneficial to overall well-being when factoring in race and ethnicity (Carnevale et al., 2016; Greenstone et al., 2013). What is lesser known is how to transition high school graduates successfully onto a postsecondary path that increases earnings and social mobility.

One area of concern is while the pool of university-bound applicants educated in the public school setting has become substantially larger, so too have the implications of entering college ill-prepared for the rigors of postsecondary work. Based on an examination of students entering a 4-year IHE for the first time in 2008, 80% returned for a second year and only 60% completed a bachelor's degree within 6 years (Musu-Gillette et al., 2016). With regard to those entering a 2-year IHE in 2011, 61% returned for a second year but less than half of first-time, full-time undergraduates earned an associate's degree within 3 years.

Along with a substantial increase in college enrollment rates, first generation college-going student demographics have dramatically changed. Within the class of 2012, seven out of 10 Hispanic high school students enrolled in IHE during the first semester following graduation surpassing White students by two percentage points (Fry & Taylor, 2013). By 2024 Hispanic student enrollment in IHE is projected to substantially outpace all prior college-going generations (Fry & Taylor, 2013). Yet, Hispanic college completion rates continue to lag behind all other student groups in obtaining a 4-year degree (Krogstad, 2016). To meet the needs of an increasingly diverse college-going population, it is becoming imperative to examine college and career readiness (CCR) indicators that influence a successful transition from high school to college positively.

Statement of the Problem

To explore the association of CCR on Hispanic postsecondary participation, I examined three state accountability indicators as they related to postsecondary enrollment and resiliency outcomes. The problem of the study was two-fold: a) determine the association of college readiness benchmark exam scores, completion of advanced/dual enrollment high school coursework, and participation in career/technology programs for Hispanic high school graduates with regard to postsecondary enrollment; b) describe the current postsecondary resiliency outcomes for the same Hispanic high school graduates from a selected school district.

Purpose of the Study

The purpose of this research was to study the association between CCR and IHE participation in terms of postsecondary enrollment and resiliency outcomes for Hispanic students. The study included an examination of the state's CCR accountability indicators through a quantitative research design. This study built on prior investigations through an analysis of student level academic records for a total of 803 high school Hispanic graduates and the 656 who met one or more CCR indicators from the class of 2014. Of particular interest was to what extent does the state's definition of CCR reflect postsecondary readiness for a traditionally underrepresented student group such as Hispanic high school graduates?

In 2010, Texas high school graduates were reported as college-ready if they earned qualifying scores on either the state's mandatory Texas Assessment of Knowledge and Skills (TAKS) 11th grade exit exam or college entrance exam, e.g., SAT or ACT, in both subject areas of English language arts and mathematics. College-ready freshmen could enroll in entry-level courses without the requirement of remedial support under the Texas Success Initiative (TSI). Those without the benchmark scores were required to complete designated supports such as mandatory tutorial programs or non-credit bearing courses in advance. Along with the increase of out-of-pocket costs, these additional prerequisites limited first year enrollment and completion rates in IHE for many students in Texas.

The school district selected for study was a minority-majority, urban, public school district located in the North Texas area with an approximate district enrollment of

26,500 students. The district serves students from early childhood education and Pre-K through 12th grade across 38 schools. In 2010, the district earned state recognition for the percentage of students graduating as college-ready across its five high schools. That year the district's 4-year graduation rate was 87.3%, of which 56% met the state's college-ready standard. The demographic profile of the 2010 graduating class detailed within the state's Academic Excellence Indicator System (AEIS) report (Texas Education Agency, 2011) reveals student composition based on race/ethnicity was 12.0% Asian (n = 189), 15.3% African-American (n = 241), 29.4% White (n =464), and 42% Hispanic (n = 662).

The 4-year graduation rate and percentage of college-ready graduates were highest for White students (92.9% and 72% respectively), lowest for Hispanic students (81.5% and 42% respectively). Furthermore, while the school district earned a distinction for the overall percentage of college-ready graduates, with regard to Hispanic students earning a high school diploma in 2010, the district had fallen below both the state and the region in comparison. On one hand, a high percentage of students in the district were meeting the state's college-ready indicator overall thus demonstrating preparedness for first year postsecondary coursework. On the other, fewer students from the targeted group were earning a high school diploma within the same cohort.

District and campus initiatives identified and implemented measures to lessen the gap between graduation rates and student demographic groups. The 4-year graduation rate rose from 87.3% (class of 2010) to 93.9% (class of 2014) surpassing both the state and region. Within this same 5-year period, variance in high school graduation rates were reduced substantially between all race/ethnicity student populations: 92.8% Hispanic, 93% African-American, 95.5% White, and 97.3% Asian (Texas Education Agency, 2015a). However, college-ready graduates remained highest for Asian and White students at 74% and 68%; lowest for African-American and Hispanic students at 47% and 49% respectively.

Comparative profile reports between the district's class of 2010 and class of 2014 show student composition for race/ethnicity remained relatively stable over 5 years for Asian students, 10.6% in 2010 versus 11.3% in 2014, and African-American students, 15.3% in 2010 versus 13.7% in 2014. Conversely, a shift in population occurred between White graduating seniors, from 29.4% in 2010 to 22.5% in 2014 and Hispanic high school graduates, from 42.0% to 50.8% respectively. While the 4-year graduation rate increased for the entire class of 2014 and across all student groups, only 56% of graduates met the college-ready graduate standard in both English language arts and mathematics (Texas Education Agency, 2015a). Thereby, while the overall percentage of students earning a high school diploma increased over the 5-year period, the district had remained stagnant in terms of graduating high school students academically well-prepared for later success at college or university.

Under statutory guidelines, The Higher Education Coordinating Board (THECB) reports postsecondary enrollment patterns for students entering Texas colleges and universities the year immediately following high school graduation. Table B.1 details an incremental increase in the number of students entering in-state postsecondary coursework for both 2- and 4-year public institutions during this 5 year time period. At a rate of 60.1%, the class of 2014 had the highest number of high school graduates attending in-state IHE with a majority of students enrolled in 2-year colleges. Twenty-six percent of the district's high school graduates (*n* = 584) attended two-year public institutes within 1 year immediately following high school graduation accounting for 59% of overall postsecondary enrollees within the cohort.

Table B.1

In-State Postsecondary Enrollment Patterns by Cohort as a Percentage of High School Graduates over 5 Years

	Class of									
	2010 *N* = 1,578		2011 *N* = 1,568		2012 *N* = 1,617		2013 *N* = 1,671		2014 *N* = 1,641	
Enrollment	%	#	%	#	%	#	%	#	%	#
In-State Postsecondary Enrollment	60.8	960	59.9	940	56.0	905	57.3	958	60.0	987
4-Yr Public University	21.9	346	220	345	19.9	322	19.5	326	22.5	363
2-Yr Public Institution	36.1	570	35.9	563	33.0	534	35.5	593	36.0	584
Private/Independent College	2.8	44	2.0	32	3.0	49	2.3	39	2.5	40

Note. Enrollment in Texas IHE within 1 year immediately following high school graduation as reported annually by Texas Higher Education Coordinating Board (2011, 2012, 2013, 2014, 2015a) and Texas Education Agency on Texas high school graduates for fiscal years 2010, 2011, 2012, 2013, and 2014.

While the overall number of students in IHE continued to rise during the first 2 years following high school graduation for all student groups, Table B.2 shows differences existed between Hispanic and the other race/ethnic groups. Postsecondary enrollment was lowest for Hispanic high school graduates at each of the enrollment periods monitored: fall semester immediately following high school (40.6%), any time during the first year after high school (47.4%), and any time during the first two years following high school (61.9%).

Table B.2

Percentage of Students Enrolled at College or University Following High School Graduation by Demographic (Cohort 2014)

	District %	African American %	Hispanic %	White %	Asian %	Eco Dis %
Enrollment	*N* = 1,641	*n* = 225	*n* = 803	*n* = 370	*n* = 185	*n* = 892
Postsecondary						
Fall Semester 2014	51.5	54.5	40.6	62.8	75.6	43.9
Any Time During First Year	61.0	60.0	47.4	67.9	77.8	49.8
Any Time During First 2 Years	68.6	65.5	61.9	76.3	88.6	61.9

Note. IHE enrollment detailed within Student Tracker Demographic Report, National Student Clearinghouse (2015). Eco Dis = Economically Disadvantaged

Lastly, there was notable disparity within the CCR state accountability indicator. The class of 2014 was the first cohort in Texas to graduate under the postsecondary CCR calculation methodology. Previously, the state's accountability system defined postsecondary readiness as the percentage of high school graduates who met a college-ready indicator based solely on benchmark exam scores on either state (TAKS) or national college-readiness exams (SAT/ACT).

Beginning with Cohort 2014, two additional measurements were included in the CCR rate and both criteria involved high school course completion requirements. One was the earning of high school credit in advanced level or dual credit courses prior to high school graduation. The other was completion of career and technology education

(CTE) courses in a designated sequence over a 2- or 3-year period of high school. Students could meet any one of the three measurements: benchmark exam scores, advanced level coursework, or CTE credits. Using the methodology for calculating postsecondary readiness in Figure B.1, the school district's CCR rate was 81.1% for the class of 2014.

Number of annual high school graduates who met TSI criteria
in both reading/ELA and mathematics

Exit-Level TAKS (spring 2013 only)		SAT (Class of 2014)		ACT (Class of 2014)
=2200 scale score on ELA and a "3" or higher on essay	or	=500 on critical reading and >=1,070 total	or	>=19 on English and >=23 composite
=2200 scale score on mathematics	or	=500 on mathematics and >=1,070 total	or	>=19 on mathematics and>=23 composite

-------------- divided by --------------

Number of 2013-14 annual graduates

Figure B.1. TSI criteria. Adapted from "Postsecondary Component – College and Career Readiness" by Texas Education Agency, *2015 Accountability Manual for Texas Public School Districts and Campuses*, p. 166. Copyright 2015 by the Texas Education Agency.

Similar to the previous college-ready standard, CCR differences existed between race/ethnicity: Asian (91.4%), White (86.5%), African-American (72%), and Hispanic (79.1%). Literature reviewed for this study found Hispanic and economically disadvantaged students generally have less access to programs or courses that impact postsecondary resiliency outcomes positively (Bromberg & Theokas, 2014; Jeong, 2009; Olszewski-Kubilius & Clarenbach, 2012; Wyner, Bridgeland, & Dilulio, 2007).

Postsecondary readiness indicators detailed within Table B.3 for the class of 2014 supports similar findings for the cohort included within the study. While a majority of the district's graduates was Hispanic (50.8%), the student group accounted for fewer CCR graduates (79.1%) with the overall highest percentage completing CTE coursework (21.5%).

Table B.3

Class of 2014 Postsecondary Readiness Indicators

CCR Indicator	District %	African American %	Hispanic%	White %	Asian %	Eco Dis %
	N = 1,641	*n* = 225	*n* = 803	*n* = 370	*n* = 185	*n* = 892
Graduation						
4-Year Rate	93.9	93.0	92.8	95.5	97.3	93.6
Advanced Course/Dual Enrollment						
Any Subject (Grades 11-12)	57.5	42.2	51.2	71.9	82.6	51.4
Any Subject (grades 9-12)	34.5	19.7	32.8	43.4	51.9	30.9
College-Ready Graduates						
Both Subjects (ELA + Mathematics)	56.0	47.0	49.0	68.0	74.0	49.0
College and Career Ready Graduates	81.1	72.0	79.1	86.5	91.4	77.6
CTE Coherent Sequence Graduates	37.4	5.1	21.5	6.9	3.4	19.9
AP/IB Results						
Participation (All Subjects)	31.2	15.6	24.4	45.8	57.5	25.7
Examinees >=Criterion (All Subjects)	59.7	44.7	45.9	70.6	76.0	49.7
SAT/ACT Results						
Tested	60.9	68.9	47.7	73.5	85.9	54.2
At/Above Criterion	28.7	7.1	16.8	46.7	47.8	18.2

Note. College and career readiness standards as reported within 2014-15 Texas Academic Performance Report for the selected school district (Texas Education Agency, 2015a).

CCR indicators detailed in Table B.4 show 73.9% of these same high school graduates from the class of 2014 completed their first year of college without remediation. At the student level, this translates into 987 students entering into postsecondary studies within the state of Texas immediately following graduation from a high school in the selected school district. Still, over 26%, or 258 students, required remediation prior to completing their first year of college.

Table B.4

College and Career Readiness Accountability Indicators for High School Graduates as a Percentage over 5 Years

	Class of									
	2010 *N* = 1,578		2011 *N* = 1,568		2012 *N* = 1,617		2013 *N* = 1,671		2014 *N* = 1,641	
Enrollment	%	#	%	#	%	#	%	#	%	#
High School Graduation										
4-Yr Rate	87.3	1,378	87.4	1,370	91.0	1,472	93.1	1,556	93.9	1,541
RHSP/DAP Degree Plan	*	*	74.9	1,174	78.0	1,261	82.7	1,382	82.1	1,347
College Ready Graduates										
ELA	70.3	1,105	66.0	1,035	72.3	1,164	65.0	1,086	68.0	1,116
Mathematics	67.0	1,057	68.0	1,066	71.0	1,148	77.0	1,287	71.0	1,165
Both Subjects	56.0	884	54.0	845	59.0	954	57.0	952	56.0	919
College/Career Ready Graduates	*	*	*	*	*	*	*	*	81.1	1,331
Graduates Enrolled in Texas IHE	*	*	59.9	940	56.0	905	57.3	958	60.1	987
Completed w/o Remediation	*	*	71.1	668	70.3	636	72.5	695	71.9	729

Note. Reported for selected school district within AEIS 2010-11 and 2011-12 (TEA, 2011, 2012); TAPR 2012-13, 2013-14, and 2014-15 (TEA, 2013a, 2014a, 2015a)
* Accountability indicator not reported.

Therefore, while the number of college-ready graduates for both subjects of English Language Arts and Mathematics (*n* = 919) closely reflects the number of students enrolling in-state IHE (n = 987), differences exist between those identified as CCR graduates (n = 1,331) and those who make the transition to college successfully (n = 729).

In summary, in this study I addressed two areas of need. First, I expanded advanced academic literature by providing insight into the relative contribution of demographic characteristics of advanced level students that have been historically absent from most of the prior studies. In 2011, Steenbergen-Hu and Moon completed a meta-analysis of 38 studies on acceleration involving academic achievement with same age peers. During the review of research publications, the authors noted specific information on ethnicity was missing from 71% of the studies, socioeconomic status was absent in 68.4%, and school type in 63.2%. To analyze the potential benefits of accelerated instruction found within AP/IB adequately, or dual credit programs, the effects of course completion specifying demographic information is instrumental. One purpose of the current study then was to contribute to the field an examination of high school CCR indicators and postsecondary resiliency factors related to students traditionally underserved in advanced level or college preparatory coursework.

Second, the research has significance in its potential impact on educational policy-makers. In the current study, I examined IHE enrollment and variables linked to the state's CCR accountability standards. Tracking the academic talent development of students based on program placement could provide key indicators descriptive of those who participate in accelerated secondary instructional programs and demonstrate postsecondary resiliency. Building upon that knowledge, program practices and interventions could be implemented to develop higher levels of postsecondary outcomes for the district's high school graduates. Thereby, the findings of this study could guide CCR program options implemented by campus and district personnel responsible for program improvement, staff development, course offerings, and student scheduling.

Research Questions

With this investigation, I explored the association between CCR and Hispanic postsecondary participation. For the population of Hispanic high school graduates, I examined three state accountability CCR indicators as they related to postsecondary enrollment and resiliency outcomes. Guiding the research were the following questions:

RQ1. Is there a statistically significant difference in postsecondary enrollment between Hispanic high school graduates identified as college and career ready and non-CCR graduates?

RQ2. Is there a statistically significant difference in postsecondary enrollment between Hispanic males and Hispanic females identified as college and career ready and non-CCR graduates?

RQ3. Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates?

RQ4. Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates at 2-year and 4-year institutes of higher education?

Assumptions

Beyond the control of the researcher is the mobility of students within a public school setting. I assumed the students had access to a minimum of 1 year of high school coursework in Texas. Furthermore, I assumed the transcript information related to advanced and AP/IB course completion was recorded correctly by the personnel at the five high schools prior to submission to Texas Education Agency (TEA). Additionally I assumed students identified their high school during the self-registration process for SAT and ACT exams. Lastly, I assumed student identification numbers provided to TEA were accurately matched by other organizations to report academic performance and participation correctly for those high school graduates within the cohort selected.

Limitations

The primary limitation to this study was the inclusion of high school students from a single graduating cohort. The study was also limited to Hispanic students within a single public school district in North Texas. An additional limitation was access to college-readiness exams. All students graduating from the five high schools included in the study had multiple opportunities to meet the CCR exam requirements based on the state’s exit-level TAKS exam as the test was offered free of charge to the students at their schools. However, neither the SAT nor the ACT was offered free of charge to students within the school district included in this study. As a result, a further limitation to the study was out-of-pocket costs associated with two out of the three qualifying benchmark CCR exams.

Description of the Design

This investigation was a retrospective, quantitative analysis of secondary academic performance and participation choices of students from a single school district’s graduating class of 2014. Targeted for the study were 803 Hispanic high school students from five high schools within a single public school district in North Texas. Through this non-experimental study, I examined the association of college readiness exams and high school course selections on postsecondary enrollment and resiliency outcomes. Being a non-experimental study, neither the independent nor the dependent variables were manipulated as they had already occurred. As a form of applied research, I explored differences between Hispanic postsecondary enrollment and resiliency outcomes based on the Texas accountability system’s definition of CCR. It differed from previous research as a result of me extending the examination of postsecondary enrollment patterns beyond the first year of college enrollment in the current study. In addition, I expanded the methodology for measuring factors of postsecondary readiness beyond a single indicator.

The conceptual framework for the study is from the model of postsecondary student success (Perna & Thomas, 2006) as shown in Figure B.2. Academic preparation within the first transition of College Readiness was represented by the three CCR indicators selected for inclusion within the study (exam scores, accelerated secondary coursework, and CTE credits). College choice, from the second transition, measured enrollment at 2- or 4-year IHE within the first 2 years after high school graduation.

The postsecondary resiliency outcome of continued IHE enrollment was associated with persistence within the third transition of College Achievement. Lastly, from the fourth transition, students who earned an industry certificate, an associate degree, or bachelor degree within 2 years of high school graduation represented educational attainment.

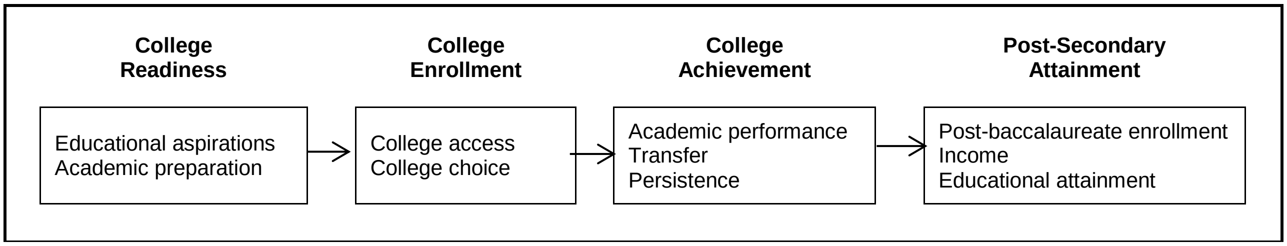

Figure B.2. Key transitions and indicators of postsecondary student success. Adapted from “A Framework for Reducing the College Success Gap and Promoting Success for All,” by L. Perna and S. Thomas, 2006, *National Symposium on Postsecondary Student Success: Spearheading a Dialog on Student Success*, p. 5. Reprinted with permission.

I collected student level data from the Division of Performance Reporting of the Texas Education Agency (2015a) and the National Student Clearinghouse (NSC, 2015) Student Tracker Academic Reports for High Schools. The data was then used to classify Hispanic high school graduates according to CCR indicators. CCR participants were identified as those who met a qualifying benchmark score on state or college entrance exams (e.g., TAKS, SAT, and ACT), earned credit in advanced/dual enrollment courses (e.g., AP/IB and dual credit), or participated in a coherent sequence of CTE courses over 2 or more years in high school. To provide insight as to whether an accountability indicator was associated with postsecondary enrollment, chi-square tests for independence were used to perform descriptive analysis for all four research questions. Researchers commonly select chi-square “to explore the relationship between two categorical variables” (Pallant, 2013, p. 225). As a nonparametric test of significance, it allows for meaningful comparison between observed differences and expected frequencies for the variables selected (Gay et al., 2012). The limiting variable for all questions was Hispanic high school graduates from a selected North Texas public school district within the 2014 cohort. The independent variable of interest for the first two research questions was group membership comprised of non-CCR high school graduates and high school graduates who met one or more of the CCR indicators. CCR indicators were those identified within the state's educational accountability system for public schools.

At the time of the study, Texas defined CCR as a measurement of high school graduates that meet any of the three postsecondary readiness targets:

1. earn a minimum benchmark score on exit-level state assessments or college entrance exams in both reading and mathematics;
2. earn credit for at least two advanced/dual credit courses during the current or prior year of high school student's graduation; and
3. enroll in a coherent sequence of CTE courses over two or more years earning three or more high school credits.

The outcome, or dependent variable, for RQ1 (Is there a statistically significant difference in postsecondary enrollment between Hispanic high school graduates identified as college and career ready and non-CCR graduates?) was defined as first semester enrollment in IHE coursework at any time during the first or second year immediately following high school graduation. RQ1's outcome was measured in terms of students with no record of postsecondary enrollment, enrollment at 2-year IHE, or enrollment at 4-year IHE. The outcome of postsecondary enrollment remained the same for RQ2 (Is there a statistically significant difference in postsecondary enrollment between Hispanic males and Hispanic females identified as college and career ready and non-CCR graduates?). However, the independent variable was defined by gender as non-CCR males, non-CCR females, CCR males, and CCR females.

The independent variable for RQ3 (Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates?), was defined by a student's type of CCR indicator. The outcome, or dependent variable, for RQ3 was postsecondary resiliency defined as students who demonstrated continued enrollment at an IHE or persisted to completion with industry certificate or diploma. The outcome of postsecondary enrollment remained the same for RQ4 (Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates at 2-year and 4-year institutes of higher education?). The independent variable became the type of postsecondary education initially attended by Hispanic high school graduates in terms of non-CCR graduate at 2-year IHE, non-CCR graduate at 4-year IHE, CCR graduate at 2-year IHE, and CCR graduate at 4-year IHE.

APPENDIX C

EXTENDED LITERATURE REVIEW

Related Literature

There is widespread evidence education plays a pivotal role in improving the quality of life (Carnevale & Cheah, 2015; Carnevale et al., 2016; Greenstone et al., 2013; Musu-Gillette et al., 2016). Few investments yield as high of a return as a college degree. On average, college graduates earn twice as much as high school graduates. Since 2009, their income has risen continually while non-college graduates have experienced a 3% decline in income (Rugabar, 2017). Increasing access to and success in higher education is a critical component of Texas' current education strategic plan (Texas Higher Education Coordinating Board, 2015b). For over a decade, the state used high stakes test scores to signal if a student was well prepared to enter college. Then in 2014, college and career readiness (CCR) standards expanded upon the definition when accelerated instructional programs and workforce ready curricular strands were included alongside college entrance exams and high school diploma plans.

The aim of this research is to determine the association of CCR indicators on Hispanic postsecondary enrollment and resiliency outcomes. Currently Hispanic students account for 52.2% of total enrollment of public schools within the state (Texas Education Agency, 2016). As such, the value of Texas public school systems will define the future wages and social mobility for the largest percentage of our students. For the purposes of this study, the researcher reviewed literature addressing the relationship between education and future earnings, measures of college and career readiness, and the role of accountability policies. The first section of the literature review takes a closer look at education through college-going trends based on enrollment, retention, and graduation rates across race/ethnicity and socio-economic status as well as the impact of income and social mobility. Measures of CCR are examined through a review of advanced level/dual credit programs, CTE educational pathways, and the use of high-stakes test to determine college readiness. Lastly, the role of accountability policies is traced through the impact of federal accountability on educational policies, the rise of postsecondary readiness indicators in the Texas accountability system, and the development of CCR state standards.

Relationship of Education and Earnings

Over the past 50 years, a large body of research has shown the profound impact poverty has on educational opportunities. Fundamental changes in the economy, jobs, and businesses have coincided with the demands for a more educated workforce. Growth in science, technology, engineering, and mathematics (STEM) education and careers is being spurred on by the fast pace of technological innovations (Kovarik et al., 2013). Many of the skills required of a 21st century workforce employee no longer requires the traditional 4-year college degree; yet nearly all require completion of some form of postsecondary education or training especially in the area of technology (Carnevale et al., 2016). Subsequently, new educational models and policy proposals are attempting to improve college retention and graduation rates.

Trends in College Participation, Retention, and Graduation

The U.S. Department of Education's National Center for Education Statistics defines the condition of education in America through reports on postsecondary enrollment, undergraduate retention, graduation rates, and degrees earned. Rates of postsecondary enrollment are categorized by type of IHE (2- or 4-year, public, or private) based on participation across age, gender, race, and origin (Musu-Gillette et al., 2016). Enrollment rates are further defined in terms of the total college enrollment rate, or the percentage of 18- to 24-year-olds enrolled in 2- or 4-year colleges or universities, and the immediate college enrollment rate, or percentage of high school students enrolled in IHE the fall immediately following high school completion (Musu-Gillette et al., 2016).

Since 2000, postsecondary enrollment rates have increased substantially in the United States (Musu-Gillette et al., 2016). In 2014, the immediate college enrollment rate for the nation’s high school completers grew five percentage points from 63% to 68%. However, one demographic group far surpassed all others. Hispanic student enrollment comprised the greatest gain over this period with an increase of 11 percentage points. Subsequently, first generation college-going student demographics have dramatically changed. In 2013, the distribution of total college enrollment rates by race/ethnicity was 58% White, 17% Hispanic, 15% Black, 6% Asian/Pacific Islander, and 1% American Indian/Alaskan Native (Musu-Gillette et al., 2016).

Based on the selected years 1990 through 2013, Hispanic enrollment in IHE nearly quadrupled from 0.7 million to 2.9 million students (Radford, Tasoff, & Weko, 2015). By 2024 Hispanic student enrollment in IHE is projected to outpace all prior college-going generations substantially (Fry & Taylor, 2013). And yet, Hispanic college completion rates continue to lag behind all other student groups in obtaining a 4-year degree (Krogstad, 2016). Looking specifically at education attainment factors for those aged 25 or older in Table C.1, non-Hispanic Whites far outpace Hispanics in terms of high school graduation 93.3% to 66.7%, some completion of college hours 63.8% to

36.8%, associate’s degrees 46.9% to 22.7%, and bachelor’s degrees at 36.2% to 15.5% respectively (Ryan & Bauman, 2016).

Table C.1

Educational Attainment by Percentage of the Population Aged 25 and Older

Educational Attainment	Total %	White %	Black %	Asian %	Hispanic %
High school graduate or more	88.4	93.3	87.0	89.1	66.7
Postsecondary education					
Some college hours or more	58.9	63.8	52.9	70.0	36.8
Associate's degree	42.3	46.9	32.4	60.4	22.7
Bachelor's degree	32.5	36.2	22.5	53.9	15.5
Advanced degree	12.0	13.5	8.2	21.4	4.7

Note. U.S Census Bureau, Current Population Survey (Ryan & Bauman, 2015)

The field “Some college hours or more” includes postsecondary certificates below the associate’s or bachelor’s degree levels. While still far lower than other demographic groups, between the academic years 2002-03 and 2012-13, the number of IHE certificates for Hispanic students increased by 95%. In comparison, Black students increased by 47%, Whites by 37%, and Asians by 34% (Musu-Gillette et al., 2016).

Workers with some form of postsecondary education comprise a much larger portion of the workforce than those with a high school diploma (Carnevale et al., 2016). Postsecondary students who complete certificates or degrees in an occupational field of study have higher employment rates than those who begin an associate’s degree program but do not earn academic credentials. Moreover, advancements in technology have significantly altered the needs of employers. A large majority of occupations are now dependent on skills once attributed solely to science and engineering programs. The leading characteristic of 21st century work environments requires the use of technology to gather, manage, interpret, and communicate information from various products or services (Asunda, 2012). As such enrollment in IHE especially those offering industry certifications continue to outpace prior cohorts in terms of first-time and returning students.

Under the Student Right-to-Know Act (1990), IHE are required to report the percentage of students completing degree-based educational programs with 150% of the normal time to complete, e.g. 3 years for an associate's degree and 6 years for a bachelor's degree. From 2013 to 2014, the retention rate of first-time, full-time students was 61% at 2-year IHE and 80% at 4-year IHE. Yet the overall total graduation rate was only 28% and 60%, respectively (U.S. Department of Education, 2016). Furthermore, a third of the nation's college enrollment begins at 2-year IHE with Hispanic undergraduate students attending at a higher percentage rate than other racial/ethnic groups (Musu-Gillette et al., 2016).

Pathways to college completion involve students transferring from programs within community colleges or to 4-year universities. Transferring from a 2-year college to a 4-year school requires students to navigate at least two separate educational systems further complicating an already complex process (Baker, 2016). Community colleges typically do not require entering students to declare an intended major or degree upon enrollment, thereby it is difficult to track student progress within departmental programs (Jenkins & Cho, 2012).

In an examination of California’s Student Transfer Achievement Reform Act of 2010, Baker (2016) found evidence that structured transfer pathways had a marginal effect on the number of students who transfer from 2-year to 4-year schools. The study focused on changes in associate’s degrees earned and the rate of transfers to bachelor‘s degree programs. After the legislation passed there was a positive increase in the number of students graduating with an associate’s degree within 3 years. Utilizing a difference-within-difference approach, the researcher found the introduction of associate’s degrees for transfer (ADT) lead to a 35% increase in graduation rates with a shift in enrollment strongest for highest achieving student groups (Baker, 2016).

Similar legislative directives in Texas included an analysis of transfer practices between 2-year and 4-year IHE between fall 2010 and spring 2015. Performance data reveal students transferring with excessive hours as the greatest concern across all peer groups and among most institutions; additionally, inaccurate and/or inadequate advising at the community college contributed to barriers to transferring course credits (THECB, 2016). Recommendations from THECB included alignment of curricula for specific degree programs through a statewide initiative and a common course numbering system to correspond with lower-division program requirements. In choosing an IHE, students self-report affordability and location as the top two reasons for enrollment, followed by personal or family reasons (Radford et al., 2015).

Evidence presented by Heckman (2003) on cost-benefit associated with schooling identified ethnic and income differentials cannot rely on tuition policies (or scholarships) provided toward the end of a student’s P-16 educational pipeline. While it is difficult to predict who will succeed in college, there are positive benefits associated with helping high school students' transition to postsecondary programs through the inclusion of access to rigorous curriculum, mentoring programs, statewide intervention efforts, and 2-year school to university partnerships.

Influence of Education on Income and Social Mobility

A large body of evidence links the relationship of postsecondary education to future earnings and factors of social mobility. More education generally translates into more dollars earned. For many, postsecondary education can be the ticket out of poverty. On average, college graduates typically earn twice as much as high school graduates and experience higher earning success over time (Carnevale & Cheah, 2015; Carnevale et al., 2011). The median annual earnings of full-time, year-round workers aged 25-34 years old with a high school diploma is $30,000; on average, those with a bachelor's degree or higher earn $20,000 more per year (Musu-Gillette et al., 2016). This disparity between wages fuels the debate over income inequality and the role of public education in preparing the next generation's labor market.

Wage disparity tied to educational attainment has led to growing concerns that "inequality of income for one generation may mean inequality of opportunity for the next" (Greenstone et al., 2013, p. 1). Whereas income for college-educated workers has risen continually since 2009, non-college graduates have experienced a 3% decline in income (Rugabar, 2017). Between January 2010 and January 2016, the U.S economy added 11.6 million jobs, of which workers with some form of postsecondary education filled a large majority of these new jobs (Carnevale et al., 2016). Furthermore, workers with some form of postsecondary education comprise a larger portion of the workforce than those with a high school diploma.

The annual release of median weekly earnings emphasizes the value of education in relation to income. In 2014, those without a high school diploma earned $488 per week (Bureau of Labor Statistics, 2015). Comparatively, high school graduates with college hours earned $668 per week while those with some college or an associate's degree earned $761. In terms of annual income, the disparity becomes even more pronounced. Income levels range from $25,376 for those without a high school diploma and $39,572 for those with some college to $62,036 for college graduates with a bachelor's degree or higher. Yet reports of educational attainment in the United States reveal only 32.5% of the nation's population age 25 years and older held a bachelor's degree by 2015 (Ryan & Bauman, 2016).

Historically, family income levels act as a predictor of college enrollment. Census Bureau data collected on 18 to 24 year old dependent family members in 2013 show students in the top income quartile had a 77.2% chance of graduating from high school, continuing on to college, and graduating with a bachelor's degree within 6 years compared to 9.1% at the bottom quartile (Callahan, Mortenson, & Brunt, 2014). Minority and underprivileged populations more commonly enroll at community colleges than the nation's most selective universities (Bastedo & Flaster, 2014). For first-generation college freshmen, costs associated with remedial courses, transfer of credit between colleges, and overall debt load contribute to the college rate of completion with long-ranging implications. In a study on the role of community colleges and college completion rates, Baker (2016) attributed costs associated with remedial courses and transfer of credits between colleges or degree plans as negatively affecting the attainment of college degrees.

With an average student loan above $30,000, nearly 70% of college graduates leave school in debt (Bidwell, 2014). Nationally the outstanding student loan debt exceeds over one trillion dollars (J. Fuller, 2016) jeopardizing the overall yield in future earnings. There is a strong likelihood the overall debt load could surpass 25% consumption of household income for those under the age of 30 in the lowest quintile (Greenstone et al., 2013). Financial aid can take the form of grants or loans. Whereas federal loans are available to any undergraduate student, the Pell Grant only assists students that demonstrate need for financial assistance. On average, Black and Hispanic full-time students receive more federal grant money than any other demographic group; comparatively Hispanic and Asian students take out the fewest education loans (Musu-Gillette et al., 2016). Issues surrounding the transition from high school to college are not new, namely the disparity between the percentage of students with plans to earn a bachelor degree and those who graduate with the degree. Studies that address the extension of CCR skills into secondary education programs with aligned IHE degree programs and access to grant-based financial assistance may help to explain underlying factors associated with the steep rise in Hispanic college-going trends among recent high school graduates.

Measures of College and Career Readiness

Texas defines CCR skills separate from high school graduation standards. Components of CCR standards may overlap with the core knowledge and skills that form the foundation of basic literacy and mathematics required in high school curriculum. However, CCR standards distinguish themselves with an emphasis on content knowledge and career specific skills that students will need to succeed in entry-level college courses covering a wide range of majors (THECB, 2009). These pedagogical influences play a key role in practices and policies associated with the development of AP/IB, dual credit, and CTE programs. Conceptions of CCR are reflective of society's values. Research findings on a wide and varied group of educators reveal many of those involved in decision-making for advanced level course placement lacked evidence-based training on how students can successfully meet CCR standards without specialized curriculum, access to advanced level coursework, or diverse program options. A review of literature revealed without training on the nature and needs of advanced level students, attitudes can negatively inform and influence student opportunities (Bastedo & Flaster, 2014; Cross, 2014; Troxclair, 2013; Wood, Portman, Cigrand, & Colangelo, 2010).

Underrepresentation in AP/IB, dual credit, or STEM-based CTE curriculum has been traced to course prerequisites, which are customary in sequence-driven subject areas such as mathematics and science. In order to participate in many of these accelerated programs, students would have had to make decisions as early as fifth or sixth grade to be on track. As a result, studies that explore interventions promoting above-grade level educational opportunities remain in the forefront of current research. These findings continue to help educators better understand the impact specialized course participation and test scores have on postsecondary educational choices.

Accelerated Instruction through Advanced/Dual Credit Courses

Research on participation rates for minority and low-income students show advanced and dual credit courses have been positively linked to college success. Previous studies have reported significant gains in increasing enrollment in rigorous courses (Burney, 2010); awarding of college credit during high school (Bromberg & Theokas, 2014); closing the achievement gap (Xiang et al., 2011); and college completion within five years (Hanover Research, 2012). Advocates of accelerated instruction bring forth the importance of above grade level programs as being cost effective and sustainable so that a student's zip code or socioeconomic status does not determine access (Olszewski-Kubilius & Clarenbach, 2012). Yet ongoing concerns persist. Even though empirical evidence exists refuting students who skip a grade are impacted negatively academically or socially, many prospective teachers–as well as current practitioners and guidance counselors–continue to rely on preconceived biases unsupported by research-based practices or student performance results (Wood et al., 2010).

In addition, students of color continue to be under-represented in top levels of academic attainment opportunities. Reports show that socioeconomic factors rather than a single reporting category such as race or ethnicity may have the greatest effect on academic outcomes:

> African Americans, Latinos, Native Americans, and English Language Learners (ELL) are severely underrepresented among the top 1%, 5%, and 10% of students at all levels of the educational system from kindergarten through graduate and professional school. A major reason for these achievement gaps is that many more African American (38%), Hispanic (32%), and American Indian (33%) children live in low socioeconomic circumstances compared to Asian (14%) and White children (17%), and at proportions well above the national average of 22%. (Olszewski-Kubilius & Clarenbach, 2012, p. 6)

Describing differences in academic performance as an achievement gap provides a measurement tool to describe differences between groups of students in relation to their average scores or proficiency rates. Historically, achievement gaps define disparities evident in standardized test scores and graduation rates between African-American or Hispanic student performance and White or Asian students.

Chambers' (2009) discussion on achievement gaps expanded upon this basis by defining outputs such as performance on standardized tests to that of a "receivement gap" contending stakeholders should focus on educational inputs, or the experiences provided to students throughout their schooling (p. 418). Poverty alone cannot explain the continued challenge faced by racially, ethnically, and linguistically diverse students (Ford, Coleman, & Davis, 2014). The implication then for researchers is to investigate various attributes found within advanced level/dual credit program participation.

Within their research on closing academically associated opportunity gaps, Olszewski-Kubilius and Clarenbach (2014) reiterate that a relience on grade level standards inevitably causes repercussions across race and class. The authors question the numerous measures of student achievement being indicative of progress when the scores reveal public schools are doing a poor job of moving capable students into the highest levels of achievement. Acceleration, or grade-skipping, allows students to participate in programs more aligned to skill abilities of students capable of completing university level work while still much younger than most college freshmen.

Strategies that go beyond standard grade-level work and result in advanced placement or credit are a defining trait of accelerated instruction. In 2004, the Templeton Report set out to dispel misconceptions about acceleration in an effort to break through the belief in a 'one size fits all' mentality about education. The publication provided examples of effective, research-based practices to challenge the continuation of a lock-step organization model of American education that dictates where a child should be in the curriculum in a certain subject area based on his or her birth date (Colangelo, Assouline, & Gross, 2004). In that regard, the Templeton Report's extensive review of accelerated instructional practices supported principles initially set forth 30 years prior by Jencks that schools should be equalizers of opportunity in America (Colangelo et al., 2004).

The College Board's AP program is one of the oldest and largest means of college-type acceleration accessible to public school students. Various studies have demonstrated the effectiveness of AP coursework as an appropriate match for high-ability students. An empiric review of best practices in gifted education by Robinson, Shore, and Enersen (2007) found fears that students would *get in over their heads* during the first year in college were unwarranted. Second year college students with AP credit had higher grade averages than those taking a traditonal first year calculus course sequence and high-ability AP students earned advanced degrees at a higher rate than their peers. Furthermore, a positive relationship between AP participation and college completion rates exists for minority and low-income students (Hanover Research, 2012).

Theokas and Saaris (2013) note in their examination of AP enrollment patterns that it has the potential power and means of disrupting the high-end achievement gap. Previous studies such as the one completed by Brody and Stanley (1991) focused on the relationship of AP scores as an important indicator of college grade point average (GPA) and honors graduation at highly selective colleges or universities (as cited in Rogers, 2004). They found participation in AP/IB classes provided 3 months additional growth in subject material and AP exam scores were positively linked to GPA in college.

This mirrors findings in a program review regarding student perceptions of AP/IB coursework, student said AP/IB coursework provided a “refreshing addition to high school curriculum” (Gallagher, 2009a, p. 114). A related study by the same researcher found early access to college credit was the primary incentive; yet as college admission criteria became more dependent on AP course taking, exam scores, and weighted GPA, these advanced courses became difficult for gifted and talented (G/T) students to avoid (Gallagher, 2009b).

Enrollment in AP courses has not gone without criticism. Acceleration has been associated with ability grouping or tracking. Critics of tracking fear schools will place the more experienced, stronger teachers with high-performing students (Loveless, Parkas, & Duffett, 2008). Moreover, there is growing concern whether student outcomes based on AP performance are a valid indicator for college credit and course placement (Ewing, Huff, & Kaliski, 2010). A study in California demonstrated that enrollment in accelerated courses had less of an impact on college graduation than the scores earned on the AP exams (Burney, 2010). Additional objections involve socioeconomic disparities due to the costs associated with taking AP exams.

There is some evidence that even after controlling for prior achievement and educational expectations, less advantaged students lag behind others on earning AP credit. Study results by Jeong (2009) linked a significant increase in the number of AP exams taken by disadvantaged populations when fee exemptions were made available. Once the socioeconomic barrier was removed, student participation in advanced level courses increased as did the number of AP exams taken by participants. Given the need to pass an exam to receive college credit or course advancement, another critique of the AP/IB format is that it sacrifices depth for breadth once the focus of the course strays from learning and applying in depth knowledge to test-taking strategies (Cross & Miller, 2007). Nonetheless, AP participation continues to swell. In 2014, over 2.3 million students across the U.S. took more than 4.1 million AP exams (The College Board, 2017).

One of the central drawing factors to AP/IB coursework is advancement or college credit. For some students, the rigorous college format is a welcome change and in many instances the first time in which they felt genuinely challenged as well as comfortable with their advanced academic interests (Gallagher, 2009a; Hertberg-Davis & Callahan, 2008). With studies showing AP/IB participation can contribute uniquely to the explanation of variance in achievement scores and elements of college success (Burney, 2010), and open enrollment policies encouraged, the rise in student participation is increasingly based on access rather than ability or targeted academic interests.

Furthermore, some school districts use a weighted GPA to attract students to these advanced level courses. This in turn has caused some to question if the courses are moving away from the acceleration framework to one better categorized as academic enrichment experiences. Certain studies support varied accelerated instructional options as pathways for increasing the representation of Black and Hispanic students (Ford, 2011; Romanoff, Algozzine, & Nielson, 2009). However, more research studies need to include specific information on participant demographics so that testing for moderators can occur; but this has been in short supply (Steenbergen-Hu & Moon, 2011).

While AP/IB programs have become more commonplace, neither was created to be the sole provider of curriculum for college preparatory coursework. Dual credit programs allow non-high school graduates the ability to enroll in college courses and receive academic credit simultaneously for both high school and college. Grades and course completion credits are recorded separately on both high school and college transcripts. Dual credit serves three program purposes: (a) provide advanced academic options for high-achieving students, (b) prepare a skilled workforce for the 21st century, and (c) increase access to college (Barnett & Stamm, 2010). It differs from dual enrollment in that students in dual credit courses earn high school and college credit for college-level coursework; while students in dual enrollment programs are concurrently enrolled in high school and college courses, they are not guaranteed high school credit for the postsecondary coursework (Miller et al., 2017).

Over 15 years ago, Bailey et al. (2002) examined the impact of dual credit programs on bridging the move from secondary to postsecondary education. Their work established that dual credit increased student motivation, success in college, and exposure to the non-academic side of college as key benefits. These findings helped to shift the function of dual credit away from providing accelerated instruction to affluent, gifted high school students to the development of Early College High Schools (ECHS) for at-risk high school students (Miller et al., 2017).

ECHS students live at home and attend a high school located on a college campus. Beginning in ninth grade, students move through an accelerated high school program with access to dual credit coursework to earn simultaneously a high school diploma and an associate's degree. The diversification of dual credit programs also includes Tech Prep programs as well as industry-based certifications that formalize the link between high school and community college course offerings. Furthermore, an increasing number of states are funding dual credit options via online education venues to reach traditionally underserved students found in rural or inner city locations.

Expansion of Career and Technology Education

Prior to the reauthorization of the Carl D. Perkins Career and Technical Education Act in 2006 (Perkins IV), CTE was commonly known as vocational education. Central to the change in legislation under Perkins IV was an increase in programs of study that lead to an industry-recognized credential, certificate at the postsecondary level, and associate or baccalaureate degrees. In terms of educational reforms, the expansion of CTE seeks to address concerns associated with minority and lower income groups tracked into vocational programs that lack technical or academic skills. To support career pathways through curriculum and program development at secondary and postsecondary institutions, federal funds are distributed through Title I and II grants (Center for Law and Social Policy, 2016). Alongside other legislative regulations such as Elementary and Secondary Education Act of 1965 (ESEA), the Higher Education Act of 1965 (HEA), and the Workforce Investment Act of 1998 (WIA), funding under Perkins IV is designed to spur innovation and support high quality education (Holzer et al., 2013). Subsequently, CTE has expanded beyond a narrow set of vocational skills to promoting student attainment of academic, career, and technical skills.

CTE approaches high school course credit within an aligned, multi-year enrollment program. Texas began development of 16 industry occupational sectors in 2000 aligned to workforce education courses offered at public 2-year colleges (Davis, 2008). Afterwards, the development of CTE to career-oriented educational systems fell primarily to community colleges. Today a greater percentage of CTE students are participating in Tech-Prep programs linking their 4-year high school graduation plan to a 2-year associate of applied science degree. To measure rates of program entry and completion, Jenkins and Cho (2012) tracked first-time community college students over 5 years. Participants included 20,220 enrolled at 23 schools beginning in 2005-16. Data field collection included transcript records, test scores, and institutional transfer information. Over a third of the students who enter into postsecondary CTE programs leave with a certificate or an associate's degree. Furthermore, the rate of credit completion rises above 60% for students who enter a CTE program of study during their first year of college. Lastly, out of 12 CTE postsecondary concentrates, they found students in nursing programs were most likely to earn a certificate or associate's degree (57%) within 5 years.

Given that CTE is a means of preparing students for the workforce, requirements of labor markets typically dictate the range of postsecondary education program concentrates. As such, manufacturing and transportation fields rely on occupational certificates while business and computer science jobs require associate's degrees or higher. Advancements in technology have led to the development of STEM-related careers dependent on technical skills. CTE programs have in turn diversified to include auto technology, medical technicians, registered nurses, machinists, and financial analysts (Asunda, 2012) as well as computer science, software engineering, robotics, and biomedical fields (Kovarik et al., 2013). Many developing healthcare and STEM-based fields support employment unaffected by 4-year degree requirements.

Bozick and Dalton (2013) examined CTE course-taking options and STEM-related courses as related to mathematics achievement for a cohort of 10th graders. Utilizing data from the Educational Longitudinal Study of 2002, public school students were surveyed about home/school experiences and administered cognitive assessments in mathematics during their 10th and 12th grade years. In their findings, mathematics achievement was largely driven by the number of academic credits and were unaffected by the replacement of mathematics courses with engineering or technical courses. Furthermore, gains in mathematics were not compromised when integrated, occupational courses common to CTE were taken at the expense of academic courses. In a separate STEM-based CTE study, researchers demonstrated significant gains in student awareness, relevance, and self-efficacy in science-related careers when teachers infused bioinformatics curriculum into the curriculum (Kovarik et al., 2013).

In reviewing literature specifically related to occupational skill programs after the passage of Perkins IV, researchers have established high school CTE and postsecondary CTE programs no longer track students away from college but instead provide students with an introduction to career pathways that help prepare for postsecondary opportunities (Holzer et al., 2013). To prepare students for high-skill, high-wage jobs in high-demand occupations better, CTE programs offer multiple points of entry for students at both secondary and postsecondary levels (Whitsett, Thomas, & Faucheux, 2015). In response to 2015 legislation addressing workforce readiness skills, Texas IHE aligned CCR objectives with clearly defined career pathways. Measures of CTE skill proficiencies now provide a substantial link between a student’s transition from a secondary to a postsecondary program. Subsequently, enrollment has become less dependent on college entrance exams.

High-Stakes Testing as a Factor of College Readiness

Madaus et al. (2009) define high-stakes tests as those in which the results are used to make important decisions. Thereby, testing becomes high-stakes when the student’s performance has significant bearing on future educational outcomes such as high school graduation or entrance to colleges. Policy-makers tend to be attracted to high-stakes testing as a system of monitoring problems associated to society and education. Since they cannot directly regulate instructional practices in the classroom, mandatory testing is used to influence classroom instruction by attaching rewards and sanctions to measures of student learning. This creates something of a paradox within high-stakes testing in that the results of test scores are used for contradictory purposes: (a) identify and help students, teachers, and schools to improve student learning, and (b) make decisions about the quality of schools based on these same students, teachers, and test scores (Madaus et al., 2009).

In addition to earning a prescribed number of course credits and days in attendance, since 1995 students in Texas public schools are required to demonstrate mastery on state tests to meet high school graduation requirements. Using tests to award or withhold high school diplomas centers on the premise graduation decisions are inherently certification decisions in that the “diploma certifies a student has attained an acceptable level of learning” (Heubert & Hauser, 1999, p. 166). Since the onset there has been substantial pushback on the use of standardized testing to demonstrate mastery levels of learning.

Critics argue that a large number of students became marginalized when Texas began holding all students to a single grade level standard (Johnson, 2009). Accountability advocates counter that without standardized testing and performance targets, students of color or those living in poverty become disenfranchised. Test scores, then, act as a barometer of proficiency. Using a method of qualitative meta-synthesis of 49 studies, Au (2007) found high-stakes tests in and of themselves do not necessarily narrow curriculum content solely to the tested subjects. High-stakes testing did in large part affect the content control over curriculum and significantly increased the use of teacher-centered pedagogical control over curriculum.

Texas currently has five end-of-course (EOC) exams as a requirement for high school graduation: Algebra I, Biology, English I, English II, and US History. Minimal passing standards vary ranging from 43% (Algebra I) to 52% (English II). Since the passage of SB-149 in 2015 and the creation of Individual Graduation Committees (IGC), students who are classified as 11th or 12th graders through 2015-16 academic school year are eligible to graduate from high school if they take and fail to achieve a passing standard for no more than two of the EOC's taken. Additionally, CCR legislation enacted within HB-1613 established there was sufficient content overlap within the state's curriculum to allow certain scores earned on PSAT, SAT, ACT, and AP exams as substitute assessments on EOC exams. Thereby, school districts have multiple avenues for secondary students to demonstrate they have attained an acceptable level of learning to graduate.

The state's accountability system considers benchmark scores from SAT and ACT college entrance exams sufficient measures of CCR. The state uses these exams to indicate a student's readiness to enter into entry-level college credit courses without remediation under the Texas Success Initiative (TSI). Education Code §51.3062 requires Texas public colleges and universities to administer a TSI assessment to first-year students who have not met existing CCR benchmark scores on either the SAT or ACT (Texas Higher Education Coordinating Board, 2016). In 2014, students taking the SAT had to score at or above a 500 on both the reading and mathematics sections with a combined score of 1050 or higher. ACT test-takers had to score a 19 on the English and mathematics portions of the test with a composite score of 23 or higher. Students without a qualifying TSI exemption could meet the state mandated assessment requirement by taking the College Board's Accuplacer assessment. The TSI assessment is a computer adaptive test designed to "assess students' readiness for college-level work in reading, writing and mathematics and to provide appropriate interventions that will improve the skills of a student who are not prepared for college-level coursework" (The College Board, 2014e, p. 4). Students who do not score at the college-level ready within 20-25 questions must complete another series of diagnostic questions to establish their academic strengths and weaknesses within the tested subject area.

Students can retake the TSIA at any time. However, the out-of-pocket expenses and the required interventions for improvement became barriers that delayed IHE enrollment. As a result, Texas recently created an alternate route for students while they are still in high school. Students who do not meet the TSIA benchmark scores in reading or mathematics can enroll in a college preparation course(s) during their senior year of high school. Those who successfully earn credit in the high school course earn a two-year exemption from TSI. Requirements include earning a grade of C or higher in the exempt content area(s) during the student's first year of enrollment at an IHE.

The overall goal of TSIA and related CCR benchmark test scores is to improve student access and success rates in IHE. Previous testing instruments did not necessarily provide meaningful information on targeted areas for remediation; instead, they acted more as "a blunt instrument for placement" into non-credit bearing developmental education courses (Texas Higher Education Coordinating Board, 2014a). Historically, the SAT and ACT have been used to identify academically talented students for college admission decisions. The format of the SAT is predictive of a student's aptitude for performance in college-based academics, and the ACT evaluates the student's achievement levels (Hanover Research, 2013). Each defines college readiness differently from the other and differently from the Texas Education Agency. The College Board establishes college-readiness benchmark scores on the reading and mathematics portion of the SAT at 590 as predictive of a 65% probability or higher of earning a 2.7 GPA during the first year of college (Kobrin, 2007). The ACT's college-readiness benchmark scores are set at 18 for English and 22 for mathematics to represent students having at least a 50% chance of earning a B or higher in a corresponding first-year college course (ACT, 2011). Neither benchmark scores were designed to measure grade level standards. Subsequently there is often a mismatch between the knowledge and skills demands of a content-driven high school curriculum and CCR accountability standards.

While test scores do not allow for a full account of high school achievement level progress, the SAT or ACT can shed light on advanced student performance levels. Prior academic performance in advanced and above-grade level coursework, as well as performing well on SAT or ACT tests taken several years earlier than normal, can contribute to developing academic self-confidence. In a study by Wilson, Siegel, McCoach, Little, and Reis (2014), researchers set out to explore changes in student perception based on enrollment in rigorous coursework. Using SAT scores, they found no differences in students' academic self-concepts between genders and some evidence that self-reported ability was a significant predictor of achievement.

Previously, Lubinski (2009) established performance on SAT at the age of 13 could identify individual differences across high-ability participants. The odds ratio of extraordinary accomplishments after 25 years reveals clear trend lines between SAT composite score (mathematics + critical reading subtests) cut scores defined by quartile influenced future educational and economic endeavors (e.g., doctorates, patents, publications, and income levels). In an earlier study, Brody and Benbow (2004) found a group of young accelerated students demonstrated the SAT scores of early entrants to college were equal to or greater than that of the typical first year freshman. Using ANOVA and chi square comparisons on various high school and college readiness factors, they also concluded there were no disadvantages to those participating in accelerated instruction especially for those students who skipped one or more grade levels.

Role of Accountability Policies in Education

The passage of Every Student Succeeds Act (ESSA) seeks to shift the investment of education from a K-12 path to one that provides alternatives to the traditional 4-year college track and seeks to develop postsecondary 21st century workforce skills. In the initial phase, ESSA marks a substantial overhaul of federal education policies related to assessment and accountability in public schools. It returns performance reporting to state and local education agencies while simultaneously requiring standards to prepare all students for success in college and future careers (U.S. Department of Education, 2017). Previously, under No Child Left Behind (NCLB, 2002) legislation, national oversight was based solely on the measurement of grade level student achievement performance objectives in order to increase high school graduation rates. ESSA, on the other hand, ties educational rating systems to high school CCR targets in order to increase postsecondary graduation rates.

Impact of Federal Educational Accountability Policies

Measuring differences in academic performance and defining differences between various student populations as a gap in learning has contributed to state and federal decision-making for over 50 years. Two of the earliest examples, Head Start and Title I programs, addressed equity issues experienced by students in America's public schools during the 1960s. Head Start was established first through the Economic Opportunity Act of 1964. Title 1 programs followed the next year with the passage of the ESEA in 1965. Introduced during the development of President Johnson's Great Society, both programs attempted to narrow gaps in school systems between the *forgotten fifth* or Black and White students and the very rich or very poor (Petrilli, 2013). Combating directly the inequalities between economically disadvantaged students and their more advantaged counterparts, attempts to improve educational attainment helped fuel the War on Poverty (Guskey, 2005). The underlying goal of the movement was to reduce variance in school experiences across the nation.

When the publication of *A Nation at Risk* was released in 1983, it shifted the pendulum of educational dialogue from one of parity to excellence (Petrilli, 2013). Concerns of mediocrity replaced those previously held about equity. States were encouraged to create their own standards and along the way developed their own corresponding assessments (Dove, Pearson, & Hooper, 2010). Competition replaced impartiality but then ESEA was reauthorized under NCLB in 2002. NCLB offered national expectation far beyond that initiated during the 1960s (Boykin & Noguera, 2011). Endorsing the idea that all children should have access to similar expectations regardless of their ethnicity, color, language, or economic status, it ushered in a major overhaul of education reforms. NCLB (2002) established even greater local controls on student academic measures by requiring states to set standards defining grade level and subject area proficiency. Schools were required to (a) report academic performance separately for various economic, ethnic, language, and disability groups; (b) identify any achievement gaps among these different student subgroups; and (c) create and take specific action steps to close the identified achievement gaps (Guskey, 2005). These tenets became the cornerstone of objective-based learning standards still in existence.

Gathering and reporting student achievement by data points became the center of educational policy-making. Under NCLB (2002), schools and school districts were measured on federally mandated annual assessments in Grades 3-11. The U.S. Department of Education also established high school graduation rates as a postsecondary academic indicator. The premise behind NCLB was all children would become proficient in the basic subjects of reading and mathematics by 2014 and the high school graduation rate for each U.S. public school would reach 90% at the all student level. Test results were published annually with Adequate Yearly Progress (AYP) reports “on the theory that public pressure would serve as an important lever for accountability and published information on achievement gaps within schools and districts in hopes of decreasing those gaps” (Coburn, Hill, & Spillane, 2016, p. 245). Student achievement was reported across every demographic student group by grade level and tested subject. Other than test scores, monitoring high school graduation rates became the basis for stronger accountability standards at both the state and federal levels.

School ratings were defined by drilling down to least common denominator of NCLB’s student sub-groups. Those who could not keep pace with the rising federal standards were identified as *underperforming*, *low-performing*, or *acceptable* by states. In reaction to AYP guidelines, local education officials focused on year-to-year changes in student performance on high-stakes tests. The results-oriented reform of NCLB allowed states to define subject and grade level proficiencies as well as graduation requirements. Over time it became difficult to compare student progress trends across the nation’s 50 NCLB state proficiency standards and measurement policy tools (B. Fuller, Wright, Gesicki, & Kang, 2007). In reviewing state summative assessments administered within the 2015-16 school year, Woods (2015) found only half gave the same grade-level tests to their students as another state. The other 25 developed assessments specific to their own educational codes. All told, in the final year of NCLB (2002), there were 29 different types of state-mandated NCLB assessments administered to students across the United States creating widespread differences in high school graduation requirements as well as grade level standards.

This was in large part due to the structure and purpose of NCLB (2002). Operating largely through state policy at the expense of local school districts, stronger accountability shifted the federal government's role in education (Chingos, 2015). While federal guidelines provided the targets of measurement, states in response designed their own assessment and accountability systems. To evaluate the overall quality of states' education systems and the impact of NCLB's educational reforms, the National Assessment of Educational Progress (NAEP) became the nation's scorecard. All states participate in NAEP testing. The results are disaggregated by gender, socioeconomic status, and race/ethnicity. It is administered to students in Grades 4, 8, and 12. While various subject areas are routinely rotated through the NAEP cycle, mathematics and reading tests are given annually to students in these three defined grade levels. Schools and sample groups of students are selected based on their generalizability to the state and nation (U.S. Department of Education, 2010). Thereby, NAEP is used to compare student performance across all states and acts as the Nation's Report Card on student progress in public schools.

NAEP scores have been on the rise for over a decade. Policy-makers champion the results as a sign provisions under NCLB is closing the achievement gap for historically disadvantaged students. With the release of *Mind the (Other) Gap! The Growing Excellence Gap in K-12 Education*, Plucker, Burroughs, and Song (2010) drew attention to a different type of achievement gap; one that involves students at the highest level of academic performance. Questioning education policies that assist only some students while leaving others behind, they caution stakeholders to reexamine the driving force of accountability standards toward a basic mastery of grade level knowledge and skills against long-term economic consequences associated with continually underserving children with advanced potential across NCLB targeted student groups (Plucker et al., 2010). Based on a 10-year analysis of NAEP advanced level scores across grade levels and states, the authors cast doubts on NCLB's ability to improve America's educational system for its highest ability groups (Plucker et al., 2010). Their work reflected similar findings from Harris and Herrington's (2006) achievement gap research on accountability, standards, and course content.

Multiple empirically-based research studies show advanced level performance gaps occur across all sub-groups, key grade levels, and subject areas (Johnsen, 2014; Mark, 2013; Smarick, 2013). Using additonal NAEP results and Plucker's work, Johnsen (2014) demonstrated even after 10 years of NCLB mandates and testing, gaps in student performance at advanced levels still remained. Nationally, advanced level mathematics scores were repoted as being on the rise. Upon review, one factor distinguished itself. Fourth grade advanced level mathematics scores for those students participating in the free/reduced programs had increased. Other student performance groups had also increased, but at substantually higher rates in comparison (Johnsen, 2014).

Academic rigor is the driving force of achievement. Those who endorse incentives believe schools held accountable for the performance of students at advanced levels will develop high achievement among lower-income students (Wyner et al., 2007). Using data from 2006, Pereira and Gentry (2013) reported Hispanic students were underrepresented in 86% of the states advanced level courses. Furthermore, the U.S. Office for Civil Rights reports for many underserved populations:

> approximately 55% of high schools offer calculus, yet only 29% of high schools with the highest enrollments of African American and Hispanic students offer the same course; the percentages for physics are similar (66% vs. 40%). The percentages for Algebra II are not as disparate (82% vs. 65%), but together reveal a pattern of unequal access to courses needed for selective colleges and careers. (Olszewski-Kubilius & Clarenbach, 2012, p. 8)

As states use NAEP results to measure student achievement levels, Chingos (2015) cautions their use to evaluate state policy and champion educational reforms. In reviewing changes in NAEP test scores between 2003 and 2013, variation in average test scores existed across states but more importantly, the relative rankings between the states changed dramatically when student-to-student demographic characteristics were taken into consideration in the state-to-state comparison models (Chingos, 2015).

Rise of Postsecondary Readiness in Texas Accountability Systems

In 1993, Texas was one of the first to enact statutory requirements mandating public school accountability systems rate school districts and evaluate schools. When NCLB (2002) reauthorized ESEA (1965), it instituted widespread national oversight tied to specific grade level student achievement targets. For Texas public school districts, NCLB established two separate and distinct performance reporting agencies: one at the national level and another at the state. The state's accountability system is based on four principles:

1. improve student achievement at all levels in the core subjects of the state curriculum;
2. ensure the progress of all students toward achieving advanced academic performance;
3. close advanced academic performance level gaps among student groups; and

4. reward excellence based on indicators other than state assessment results (Texas Education Agency, 2015b).

Prior to 2013, the performance of students in each public school and district in Texas was included in the state's accountability report known as AEIS, or Academic Excellence Indicator System. Initially Texas school district performance summary reported only the percentage of students meeting the basic passing standards for subject area proficiency. These results were disaggregated by grade level for five ethnic groups (African-American, Hispanic, White, Native/American Indian, or Asian) and two sub-groups (students identified as economically-disadvantaged and served by special education programs). Coinciding with the introduction of NCLB (2002), passing results for Limited English Proficiency (LEP) students were included beginning in 2002-2003. That same year the percentage of commended (i.e., advanced level) test scores on state-mandated TAKS assessments were also added. Since 2012, academic accountability ratings for public schools have been based primarily on student performance on the State of Texas Assessments of Academic Readiness (STAAR) exams in Grades 3-8 and high school.

Postsecondary readiness factors were included in the state's assessment and accountability systems for Texas public schools with the passage of House Bill (HB) 3, in 2009. An additional indicator measuring the number of college-ready graduates was added to campus and district ratings in 2013 with the passage of HB-5. Then in 2015, the state's accountability system expanded postsecondary readiness measures. By including students who earn credit for at least two advanced/dual enrollment courses or enroll in a coherent sequence of career and technical education (CTE) courses during high school, the shift from graduating students as college ready to one defined as college and work force ready was complete.

As a measure of the standards-based reform in public education, information on high school graduation rates and CCR are reported by the state to school officials and released to the public four times within an academic school year: (1) August, through the release of campus and district state ratings; (2) November, within TAPR; (3) January, included in the State School Report Card; and (4) February, simultaneously in both the Federal School Report Card and web-based Texas Performance Reporting System (TPRS) (Texas Education Agency, 2015e). In August, with the release of state rating designations, student performance and participation is reported at the all student level, disaggregated by seven race/ethnic groups and three sub-groups (special education, Bilingual/ELL, and economically-disadvantaged). The ratings are comprised of four indices: student achievement, student progress, closing the achievement gap, and postsecondary readiness. Index 1, student achievement, is a snapshot of how many tests taken by students met the state's passing standard on state assessments. Index 2, student progress, measures year-to-year student growth by subject and student groups. Index 3, closing the achievement gap, tracks advanced academic achievement of economically disadvantaged students and traditionally disadvantaged groups (e.g. Hispanic and African-American students). Index 4, postsecondary readiness, highlights the importance of earning a high school diploma that provides students with the foundation necessary for success in college, the work force, job training programs, or the military (Texas Education Agency, 2015e).

TAPR is released 3 months after ratings have been published and after the decisions regarding appeals on state rating designation has been finalized (Texas Education Agency, 2015e). The information provided on TAPR can be categorized into three categories. The first is recap of student performance on STAAR tests previously released in August with cumulative information across all tested subject areas based on grade levels. Secondly, postsecondary readiness indicators are detailed through graduation and dropout rates, advanced course/dual enrollment completion, performance on college entrance exams such as SAT, ACT, and AP/IB, as well as enrollment patterns in Texas IHE following high school graduation. Lastly, TAPR includes a profile of student information such as attendance rates, student ethnic distribution, student enrollment by grade level, retention rates, and program service enrollment along with a profile of staffing information such as teachers by ethnicity and gender, degrees earned, years of experience, salary, and turnover rates.

Released in January, State School Report cards condense the state rating designation (previously reported in August) and TAPR (published in November) into 2-4 page summaries that must be distributed to every student currently enrolled within the district (Texas Education Agency, 2015e). Released in February, Federal Report Cards include NCLB-mandated reporting fields (i.e., Title I designations). These reports must be made available electronically to the public with access to hard copy upon request at either the campus or district level. Lastly, TPRS is a web-based, interactive program available on the Texas Education Agency's website. It offers the most comprehensive view of student performance at the campus, school district, region, or state level. TPRS provides information for all tests taken regardless of student inclusion in the accountability snapshot. It also reports student performance and participation in student groups previously unreported: gender, at-risk, and migrant.

Furthermore, postsecondary readiness factors comprise 25% of district and campus ratings. In order to earn postsecondary readiness recognition within the state's current accountability system, districts must meet 70% of the distinction outcomes. The overall number of outcomes used to determine the target score for postsecondary distinction is based on the total number of campuses included within a school district. Only five of the indicators are based on high school student performance on the STAAR end-of-course exams. The other 45 postsecondary indicators account for 56% of the distinction target score which includes: graduation rate and plans, college-ready graduates, advanced/dual enrollment course completion, AP/IB exam performance, SAT/ACT participation and performance, as well as coherent sequence of CTE-related coursework.

One of the overall goals is to establish Texas among the top 10 states in the nation by 2030 on postsecondary readiness factors. To accomplish the objective, HB-2804 created the Texas Commission on Next Generation Assessments and Accountability (Texas Education Agency, 2015d). Next Generation is a 15-member committee that reports to the governor and legislature recommendations to improve system of student assessments and public school accountability (Texas Education Agency, 2015d). The Commission was required to develop and report the statutory changes on September 1, 2016. Key to their purpose statement is the alignment of CCR indicators to state performance standards in collaboration with two state agencies: (1) Texas Workforce Commission and (2) Texas Higher Education Coordinating Board.

Additionally, the Next Generation Commission must establish policy changes enabling students to progress through grade levels and coursework reflective of their mastery and demonstration of skills (Texas Education Agency, 2015d).

In December 2015, Governor Greg Abbott selected Mike Morath, the initial chair of Next Generation Commission and former Dallas Independent School District's school board member, to replace outgoing Texas Commissioner of Education, Michael Williams (Texas Education Agency, 2015d). During his introductory address to the Texas Association of School Administrators (TASA) at the 2016 Midwinter Conference, Morath (2016b) recounted his own personal accomplishments through accelerated instructional opportunities, singling out participation in AP classes. His comments lent support to increasing student access to measurable above-grade level performance standards and placed a premium on redesigning college preparation for all students in Texas (Morath, 2016b). Likewise, legislation passed in 2015 during the 84th legislative session increased student opportunities to learn at their own pace commensurate with accelerated instructional practices.

Development of College and Career Readiness Standards in Texas

For over a decade, Texas has used high-stakes test scores to signal if a student was well prepared to enter college. Then in 2014, college and career readiness (CCR) standards expanded upon the definition when accelerated instructional programs and workforce ready curricular strands were included alongside college entrance exams and high school diploma plans (Texas Higher Education Coordinating Board, 2015b). Postsecondary enrollment is a component of CCR standards reported in state accountability systems throughout the United States. The path to higher CCR standards includes opportunities for high school students to participate in above-grade level or CTE coursework. States must identify and address inequalities related but not limited to student access to these various forms of advanced level instruction. To meet this requirement and other federal guidelines, Texas public school districts report college enrollment trends as well as the financial allocation of resources and personnel based on CCR indicators during state-mandated public hearings before local school boards.

In 2006, Texas was the first state to require the development of CCR indicators within their educational standards. Beginning with English language arts and reading (ELAR), THECB adopted CCR standards in 2008. The State Board of Education (SBOE) then incorporated CCR into Texas Essential Knowledge and Skills (TEKS). Mathematics and science CCR curriculum content standards were introduced in 2009 followed by social studies in 2010. TEKS define what teachers are teaching in the classrooms and what students should be able to demonstrate based on specific, measurable sets of knowledge and skills for each content area by grade level. Along with CCR indicators, student expectations outlined within the TEKS is a statutory requirement forming the bedrock of public education (Morath, 2016a).

The SBOE adopted CCR and TEKS alignment charts in 2015 to establish justification for the Texas Success Initiative, or TSI, benchmarks in response to HB-1613. Previously the SBOE was only required to incorporate CCR into TEKS. The alignment charts reflect a tighter relationship between postsecondary educational standards of Texas and instructional practices taking place in advanced level classes. The operational definition of postsecondary readiness based on STAAR test results is 60% probability that students with a satisfactory score are “reasonably likely . . . to succeed (with a grade of C or higher) in an entry-level, credit-bearing course in that content area for a baccalaureate degree or associate degree program" (Morath, 2016a, p. 14). Direct empirical evidence was used to map content area and grade level postsecondary readiness cut points on STAAR tests. Correlation studies established standard-setting progress. Included in the analysis were a variety of student achievement measures on the national (NAEP, SAT, and ACT), state (THEA, TAKS, and STAAR), and local levels (grades earned in high school and college on related courses). Furthermore, since STAAR was the first assessment in Texas correlated to NAEP, it provided a level of accuracy in state assessment requirements that is reflective of nation's standard of CCR proficiency (Morath, 2016a).

Within the latest U.S. Census Bureau survey, Texas was ranked 32 in educational attainment and last in the U.S. for high school completion (Ryan & Siebens, 2012). In terms of college participation rates for students from low-income families, Texas ranked 43 in 2012 and at 28.7%, enrollment the state was well below the national average of 39.4% (The Pell Institute for the Study of Opportunity in Education, 2013). Hence, the number of CCR accountability standards has more than doubled, from 14 in 2011 to 38 in 2015 for public school districts in Texas. New requirements for IHE tied to CCR and postsecondary resilency factors were also mandated in 2015 under HB-1992, HB-2628, and SB-1776. Previously Texas public colleges and universities could establish minimum passing standards on entrance exams for college course credit. Under HB-1992, an IHE can no longer require scores above 3 on an AP exam for lower division courses (Texas Education Agency, 2015c). Subsequently THECB has begun a longitudinal study into the performance of undergraduates who receive college credit for the new AP cuts scores.

Limitations to dual credit access were effectively removed under three separate bills: HB-2812, HB-505, and HB-18. HB-2812 allows student participation in dual credit, off-campus programs to count within daily attendance rates as instructional time, a critical component of campus and district accountability measures. HB-505 eliminates the cap on the number of dual credit courses a student may take within not only a single semester, but also across a student's entire high school graduation program. Additionally, it removes grade level stipulations tied to dual credit enrollment eligibility. Lastly, HB-18 requires schools to offer students the opportunities to earn the equivalence of at least 12 semester credit hours of college credit while in high school (Texas Education Agency, 2015c). While HB-18 has the greatest impact on high schools, it also affects middle school grade levels as well as IHE. Beginning in seventh or eighth grade, students are to be provided classrooom instruction in preparation for high school, college, and careers, the very backbone of CCR. At the other end of the academic educational spectrum, under HB-18, IHE will report to each school district from which the student graduated from high school all available information about student postsecondary performance with demographics included (Whitsett et al., 2015).

Additional provisions within HB-2628 address an underlying problem associated with cost of postsecondary enrollment and completion rates. If an IHE offers a similar program, students must receive academic credit for each of courses completed successfully, thereby ensuring progress through a program of study is uninterrupted for students transferring to another public college or technical institution within the state

(Texas Education Agency, 2015c). Likewise, SB-1776 exempts high school graduates from TSI requirements for 2 years after high school if the student has successfully completed a college preparatory course while in high school and takes their first credit-bearing course in his or her first year of IHE enrollment. Recall the TSI benchmark was used to determine students with a 60% likelihood of earning a C or higher during postsecondary work. THECB no longer requires an IHE to assess the academic skill level of every incoming student to determine readiness for college-level instruction. Subsequently, with the rise of CCR accountability indicators, Texas has not only increased access to academic postsecondary success factors, but it has also removed multiple obstacles affecting postsecondary retention rates.

Summary

Over the past 50 years, a large body of research has shown the profound impact poverty has on educational opportunities. Advocates of public school education value access to educational opportunities for all students regardless of race, ethnicity, socioeconomic status, or religious affiliation. In response, the role of public education has extended beyond the typical K-12 grade span to one that encompasses the PK-16 academic years. Consequently, measures of CCR are gaining weighted value within school accountability systems and drawing the attention of public school stakeholders.

Taken collectively, national and state CCR initiatives signal a change in the definition, development, and measurement of postsecondary attributes. One common theme that runs through these various investigations is access to challenging educational opportunities. A deeper understanding of perceptions held by stakeholders can shed light on the role of schools in promoting access to advanced programs. In reviewing research specific to closing the achievement gap, evidence strongly suggests students with high level academic abilities benefit when educational programs meet their instructional needs. Existing research provides evidence that certain populations of students with potential to achieve at high levels are being shortchanged by federal mandates (Plucker et al., 2010).

Furthermore, postsecondary research on participation rates for minority and low-income students increasingly show advanced level/dual credit coursework positively linked to college success. High school transcripts and course completion has been shown to be more useful than SAT or ACT results alone in determining college completion (Scott-Clayton, Crosta, & Belfield, 2014). Research on accelerated instruction suggests AP exam performance correlates with later success in college (Brody & Benbow, 2004; Burney, 2010; Colangelo et al., 2004; Robinson et al., 2007). Furthermore, students who enter CTE programs of study during their first year of community college earn diplomas or industry certifications at a higher rate than their peers (Baker, 2016; Jenkins & Cho, 2012).

In closing, public school education is a hallmark of democracy. Its ideology is rooted in the shared value that through the establishment of tax-supported and publically controlled schools, all children in the U.S. can be educated (Gutek, 2004). The foundation of education centers on the American ethos that though individuals in our society may start poor, they can become prosperous through hard work, thereby success is not predetermined by the lot in life to which one is born into (Greenstone et al., 2013).

APPENDIX D

DETAILED METHODOLOGY

Design of the Study

This investigation was a post-hoc analysis of secondary academic performance and participation choices of Hispanic students within a single Texas public school district. As a form of applied research, the study examined the association between Hispanic postsecondary enrollment and resiliency outcomes based on the Texas accountability system's definition of college and career readiness. To provide insight as to whether an accountability indicator related to postsecondary enrollment, I generated the following research statements:

RQ1. Is there a statistically significant difference in postsecondary enrollment between Hispanic high school graduates identified as college and career ready and non-CCR graduates?

RQ2. Is there a statistically significant difference in postsecondary enrollment between Hispanic males and Hispanic females identified as college and career ready and non-CCR graduates?

RQ3. Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates?

RQ4. Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates at 2-year and 4-year institutes of higher education?

To test the likelihood of postsecondary participation I conducted four separate chi-square tests of independence using the same sample population from a 2014 cohort of high school graduates. Researchers commonly select chi-square "to explore the relationship between two categorical variables" (Pallant, 2013, p. 225). As a nonparametric test of significance, it allows for meaningful comparison between observed differences and expected frequencies for the variables selected (Gay et al., 2012). Within this study, the outcome event was nominal (categorical) in that it either occurred, e.g., student entered into IHE, or it did not. Likewise, the independent variables of CCR and gender were both mutually exclusive thereby categorical data.

Upon IRB approval, I used SPSS Version 22 to calculate descriptive statistics under the crosstabs procedure. The test statistics table of SPSS reports chi-square values in terms of degrees of freedom, *p* values, expected counts in comparison to observed counts as well as the percentage of actual participant counts for the observed data (Pallant, 2013). For the first research question, I hypothesized there was an association between postsecondary enrollment and CCR indicators for Hispanic high school graduates. For the second research question, I hypothesized postsecondary resiliency and CCR are associated for the same population of Hispanic students.

Setting

Targeted for the study were 803 Hispanic high school graduates from five high schools within a single North Texas public school district. The district was a minority-majority, urban school district with an overall enrollment of 26,152 students in 2014. The district served students from early childhood education and Pre-K through 12th grade in the North Texas area. Hispanic student population (n = 14,456) represented 55.3% of the district's overall ethnic distribution and 48.9% (n = 803) of the graduating class (N = 1,641).

Overall, 64.7% of the students were identified as economically disadvantaged based on free/reduced lunch program participation (*n* = 16,918). At the time of the study, students served by the Title I program were in 34 out of 36 schools within the district. Additional demographical data descriptive of the district include student representation in Bilingual/ELL programs at 27.7% (*n* = 7,233), CTE at 19.6% (*n* = 5,137), special education at 9.3% (*n* = 2,435), and 7.8% of students (*n* = 2,041) identified for gifted and talented services (G/T).

Population and Sample

From the state's accountability report (Texas Education Agency, 2015a), student composition by race/ethnicity for the district's 2014 graduating class (*N* = 1,641) was 11.3% Asian (*n* = 185), 13.7% African-American (*n* = 225), 22.5% White (*n* = 370), and 50.8% Hispanic (*n* = 803). As research participants consisted solely of Hispanic students from this cohort, the initial sample group represented slightly more than half of graduates for the district.

Table D.1 details the composition of Hispanic graduate participants included within this study (*N* = 803) of which 48.1% were male (*n* = 386) and 51.9% female (*n* = 417). Students identified as economically disadvantaged were 77.5% (*n* = 622) and students identified for the G/T program were 9.2% (*n* = 74). Composition of those graduates meeting the CCR criteria (*n* = 657) was 45.8% male (*n* = 301) and 54.2% female (*n* = 356), of which 76.9% (*n* = 505) were economically disadvantaged. G/T students (*n* = 71) represented 10.8% of Hispanic CCR graduates in 2014.

Table D.1

Composition of Hispanic Cohort 2014 Graduates

Demographics	Total Graduates (n = 803)		CCR Graduates (n = 657)	
	%	#	%	#
Gender				
Male	48.1	386	45.9	301
Female	51.9	417	54.1	356
Free/Reduced				
Non-participant	22.5	181	23.2	152
Participant	77.5	622	76.8	505
Gifted and Talented				
Non-participant	90.8	729	89.2	586
Participant	9.2	74	10.8	71

Note. Profile of high school graduates from Texas public school district in the study.

Instruments

CCR indicators were those identified within the Texas educational accountability system for public schools. At the time of the study, CCR was a measurement of high school graduates who meet any one of three postsecondary readiness targets. One CCR option was earning a minimum qualifying score on exit-level state assessments or college entrance exams in both reading and mathematics. Another was completing at least two advanced/dual credit courses during the current or prior year of a high school student's graduation. The third CCR indicator was enrolling in a coherent sequence of CTE courses over 2 or more years earning three or more high school credits.

To qualify as a CCR graduate based on exam performance, a student must have met a Texas Success Initiative (TSI) benchmark score on either the exit-level Texas

Assessment of Knowledge and Skills (TAKS) exam or a national college-readiness exam (SAT/ACT) in both reading and mathematics as shown in Figure D.1. TAKS was an untimed test with a maximum raw score total for reading of 73 and 60 for mathematics. Students within the 2014 cohort had five opportunities to test prior to high school graduation.

Number of annual high school graduates who met TSI criteria
in both reading/ELA and mathematics

Exit-Level TAKS (spring 2013 only)		SAT (Class of 2014)		ACT (Class of 2014)
=2200 scale score on ELA and a “3” or higher on essay	or	=500 on critical reading and >=1,070 total	or	>=19 on English and >=23 composite
=2200 scale score on mathematics	or	=500 on mathematics and >=1,070 total	or	>=19 on mathematics and>=23 composite

-------------- divided by --------------

Number of 2013-14 annual graduates

Figure D.1. TSI criteria–Reading ELA and mathematics. Adapted from “Postsecondary Component – College and Career Readiness” by Texas Education Agency, *2015 Accountability Manual for Texas Public School Districts and Campuses*, p. 166. Copyright 2015 by the Texas Education Agency.

THECB educational standards established TSI qualifying scores for the TAKS tests. The minimum TSI score for reading on the exit-level TAKS test was 2200 scale score in English language arts combined with a 3 or higher on the essay (Texas Education Agency, 2017c). In order to earn a scale score of 2200 on the TAKS ELA test, research participants had to correctly answer 67% (n = 49) to 73% (n = 53) of the test questions and score a 3 out of 7 points on the essay response (Texas Education Agency, 2014f).

TAKS mathematics minimum benchmark scale score was also set at 2200. To earn the TSI qualifying score, students had to correctly answer 67% (*n* = 40) to 68% (*n* = 41) of tested mathematics questions (Texas Education Agency, 2014f). Depicted in Table D.2, at the district level the mean scale score for Hispanic students is above 2200 for only the first ELA and mathematic TAKS exit-level test administered in April 2013 while the students were in the 11th grade.

Table D.2

Hispanic TAKS Scale Scores by Test Administration

	All Student		Hispanic	
	State	District	State	District
Exit-Level	Mean Scale Score			
Grade 11				
April 2013				
English Language Arts	2090	2296	2079	2275
Mathematics	2026	2299	2026	2265
July 2013				
English Language Arts	2036	2144	2032	2103
Mathematics	2030	2093	2029	2064
Grade 12				
October 2013				
English Language Arts	2174	2181	2140	2150
Mathematics	2088	2095	2075	2065
March 2014				
English Language Arts	2071	2108	2045	2073
Mathematics	2055	2082	2049	2058
April 2014				
English Language Arts	2080	2126	2060	2120
Mathematics	2048	2066	2042	2056

Note. Texas Assessment of Knowledge and Skills summary reports by group performance of all students statewide and district study site (TEA, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g; TEA, 2014b, 2014c, 2014d, 2014e).

Another option for meeting the TSI qualifying exam score was earning 500 or higher in both sections of critical reading and mathematics of the SAT with a combined score of 1070 or higher. The College Board administers the SAT seven times a year. Scale scores for each section range from 200 to 800. In order to earn a minimum scale score of 500, students had to correctly answer 52% (*n* = 35) of the critical reading test questions and 56% (*n* = 30) of the mathematics section (The College Board, 2013). Students scoring 550 in critical reading and 570 in mathematic represented the 75th percentile of SAT test takers (The College Board, 2013). Tables D.3 and D.4 detail SAT critical reading and mathematics mean scores by ethnicity and gender for participants in the study.

Table D.3

SAT Critical Reading Mean Scores by Ethnicity and Gender

	State			District		
Ethnicity and Gender	*N*	*M*	*SD*	*N*	*M*	*SD*
Total Students	179,036	476	113	929	486	105
Male	83,488	479	116	415	488	105
Female	95,548	473	110	514	484	106
Mexican/Mexican American	32,860	441	102	199	458	92
Male	15,991	442	105	84	469	90
Female	16,869	441	98	115	451	92
Puerto Rican	1,034	477	109	5	*	*
Male	478	476	115	2	*	*
Female	556	477	103	3	*	*
Other Hispanic or Latino	33,784	426	100	169	446	90
Male	14,288	431	105	84	450	87
Female	19,496	422	96	85	441	91

Note. Profile of 2014 college-bound senior state and district reports (The College Board, 2014a, 2014b, 2014c). *masked.

Table D.4

SAT Mathematics Mean Scores by Ethnicity and Gender

	State			District		
Ethnicity and Gender	*N*	*M*	*SD*	*N*	*M*	*SD*
Total Students	179,036	495	110	929	514	101
Male	83,488	509	115	415	528	102
Female	95,548	483	104	514	502	98
Mexican/Mexican American	32,860	467	97	199	489	87
Male	15,991	478	102	84	510	91
Female	16,869	456	90	115	474	81
Puerto Rican	1,034	478	105	5	*	*
Male	478	4901	109	3	*	*
Female	556	466	100	2	*	*
Other Hispanic or Latino	33,784	449	96	169	468	86
Male	14,288	463	102	84	477	78
Female	19,496	438	89	85	459	92

Note. Profile of 2014 college-bound senior state and district reports (The College Board, 2014a, 2014b, 2014c). *masked.

The College Board published these scores within their annual profile on college-bound senior report. Thereby, these results reflect scores from the last SAT exam taken by a student regardless of his/her classification at the time of testing. In the area of critical reading, there was relatively little difference between male and female mean scores for Hispanic students within the state of Texas's graduating class of 2014. However, there was a substantial difference on SAT mathematics. The mean score for females on SAT mathematics was 12 points lower than the total class average and 26 points lower than males. As evident for state and district test-takers, SAT mean score for Hispanics was below the TSI requirement in both critical reading and mathematics. ACT was the third TSI option for qualifying CCR benchmark exam scores. Students had to score 19 or higher in both English and mathematics with a minimum composite score of 23. Students have six opportunities to take the ACT during a school year. Scale scores for each section range from 1 to 36. The English portion of the ACT was a 75 question, 45-minute test. Content covered includes punctuation, grammar and usage, sentence structure, strategy, organization, and style (ACT, 2015). Mathematics was a 60 question, 60-minute portion of the ACT. It covered pre-algebra, algebra, geometry, and trigonometry content skills.

Dependent on the ACT administration, to earn a score of 19 on the ACT English test, students must have accurately answered between 56% (n = 42) and 59% (n = 44) of the test questions (ACT, 2015). To earn a qualifying score on the mathematics portion of the ACT test, students had to answer 48% (n = 29) to 50% (n = 30) correctly. A score of 19 placed students in the 44th percentile in English and 47th percentile in mathematics (ACT, 2015). Whereas the ACT mean score for Hispanics was above the TSI qualifying score in mathematics, Table D.5 shows mean scores were below the requirement in ACT English for participants included from the selected school district.

TSI exam performance was only one method in which high school students could graduate with CCR designation. Alternate methods included secondary course participation through either advanced level or CTE classes. With the addition of AP/IB options, Texas offered a total 208 secondary advanced academic courses of which 36% (n = 74) were available to the study's participants. Table D.6 illustrates participants had more CCR course choices overall in the subject area of fine arts (n = 21) followed by foreign language (n = 15).

Table D.5

ACT Mean Scores by Ethnicity and Gender

Ethnicity and Gender	State			District		
	N	*%*	*M*	*N*	*%*	*M*
English						
Ethnicity						
Total Students	116,547	100%	19.8	429	100%	19.5
Hispanic/Latino	45,717	39%	17.2	87	20%	17.5
Gender*						
Male	53,090	46%	19.7	186	43%	19.5
Female	63,447	54%	19.9	231	54%	19.6
Mathematics						
Ethnicity						
Total Students	116,547	100%	21.4	429	100%	21.8
Hispanic/Latino	45,717	39%	19.5	87	20%	20.3
Gender						
Male	53,090	46%	22.0	186	43%	22.5
Female	63,447	54%	20.9	231	54%	21.3

Note. Profile of graduating class 2014 college readiness reports (ACT, 2014). *missing state gender data for 10 students.

Table D.6

Count of Advanced High School Courses by Subject Area

	Advanced Level			AP Courses			IB Courses		
	State	District		State	District		State	District	
Subject Area	(n=108)	(n=27)	%	(n=31)	(n=27)	%	(n=69)	(n=20)	%
English Language Arts	11	5	45	2	2	100	2	2	100
Mathematics	3	1	33	3	3	100	4	3	75
Technology	2	2	100	1	1	100	3	2	67
Fine Arts	20	12	60	5	3	60	9	6	67
Science	0	0	0	4	4	100	6	3	50
Social Studies/History	2	0	0	9	8	89	14	1	7
Foreign Language	68	7	10	7	6	86	28	2	7
Other	2	0	0	0	0	0	3	1	33

Note. Advanced academic courses with % of courses available to students as reported by TAPR (Texas Education Agency, 2015e) and Study Site district's 2013 Educational Planning Guide.

Students had the same number of AP and advanced level course offerings (*n* = 27) within the selected school district representing 87% of AP courses but only 25% of the advanced level courses available in Texas.

While TEA did not specify dual credit participant options, it annually reports subject area enrollment by school districts and colleges. Students included in the study had dual credit course options at all five high school campuses. While a large majority of students completed dual credit courses through attendance at two local community colleges, students within the study also earned advanced mathematics dual course credits at a 4-year public university.

In comparison to advanced academic courses (*n* = 74), participants had a higher number of dual credit course options (*n* = 103). Table D.7 depicts participant dual credit options by their respective subject area. The greatest number of choices occurred in the area of foreign language (*n* = 21) followed by technology (*n* = 18). The fewest offerings were in communication or language arts (*n* = 3).

Table D.7

Dual Credit Course Options

Course Options	District *N = 103*
Business	11
Communication	3
Fine Arts	10
Foreign Language	21
Mathematics	11
Science	14
Social Studies	15
Technology	18

Note. Study Site District’s 2013 Educational Planning Guide.

Participants who enrolled in a coherent sequence of career/technology education (CTE) courses also qualified as CCR graduates. To meet this criterion, students completed two or more CTE courses earning three or more high school credits prior to high school graduation. Texas has identified 198 secondary CTE courses in 16 subject areas as shown in Table D.8. For those students included within the study, the school district offered 65% of the available CTE courses (*n* = 129). Similar to the dual credit program, the greatest number of CTE choices occurred in the field of art, audio-visual technology and communication (*n* = 18) and STEM subject areas (*n* = 13).

Table D.8

Count of Career and Technology Education Courses by Subject Area

Subject Area	State (*n* = 198)	District (*n* = 129) #	District %
Agriculture, Food, and Natural Resources	27	10	37
Architecture and Construction	21	6	29
Arts, A/V Technology, and Communication	21	18	86
Business Management and Administration	11	10	91
Education and Training	4	4	100
Finance	9	3	33
Government and Public Administration	9	1	11
Health Science	9	9	100
Hospitality and Tourism	10	6	60
Human Services	13	11	85
Information Technology	9	7	78
Law, Public Safety, Corrections, and Security	10	8	80
Manufacturing	8	7	88
Marketing	8	7	88
Science, Technology, Engineering, and Mathematics	15	13	87
Transportation, Distribution, and Logistics	14	9	64

Note. CTE courses with % of courses available to students as reported by TAPR (TEA, 2017b) and Study Site District's 2013 Educational Planning Guide.

Data Collection

The district's Department of Assessment and Accountability maintains student level records of test scores, course participation, and postsecondary enrollment. As a member of the central office administrative staff assigned to the data and technology division of curriculum and instruction, I secured permission to access pre-existing academic records of participants for the purpose of data analysis. With school district consent, I collected 3 years of longitudinal student-level assessment and course enrollment data from the Performance Reporting Division of the Texas Education Agency (2013a, 2014a, 2015a) and the National Student Clearinghouse (NSC, 2015) Student Tracker Academic Reports for High Schools.

Figure D.2 depicts the subject flow through the study in which data collection points were reviewed. I compiled all student information within a single Excel workbook through the six-digit identification number locally assigned by the school district to each student. Specifically, the dataset consisted of performance by the graduating class of 2014 on three TSI exams (TAKS, SAT, and ACT) from a North Texas school district.

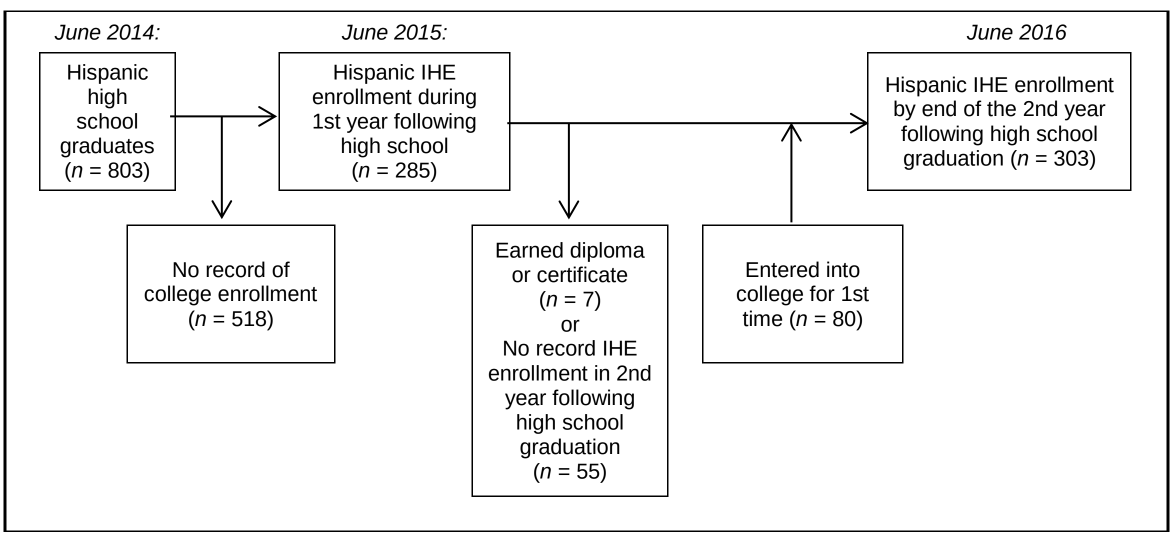

Figure D.2. Subject flow through the study.

The Performance Reporting division of the Texas Education Agency receives TSI results annually from the Texas Higher Education Coordinating Board (2014b). It matches the TSI results to students on their "annual graduates list using an algorithm which includes social security number, first name, last name, and date of birth," then, it matches the results to schools based on the high school graduates Public Education Information Management System (PEIMS) identification number (Texas Education Agency Performance Reporting, personal communication, October 13, 2017). In Texas, a student's PEIMS ID number is typically his or her social security number; otherwise, it is a state-issued identification number unique to the child.

I cross-matched Texas Education Agency student graduation records with NSC college enrollment records through an Excel-based V-LOOKUP formula using local student ID and social security number or state assigned ID. To ensure student confidentiality was maintained through the masking of data, participants were assigned a unique code ranging from 1 to 803 tied to their locally assigned school number.

Texas Education Agency released information on postsecondary CCR indicators to public school districts as an Excel-formatted data file accessible 14 months after the students had graduated from high school. The data file contained student name, date of birth, race/ethnicity, social security number, state-assigned ID number, campus/district code for the graduate's high school, and postsecondary CCR indicator designation. TEA matched SAT and ACT results through the district's enrollment records based on either a social security number or the state assigned ID number reported by students during test registration. Each of the CCR indicators was identified as a discriminate field within the Excel-formatted data file in terms of the dichotomous value of 1 (met CCR standard) or 0 (did not met CCR standard). For the purposes of this study, I collected the following data on each participant:

1. Met CCR indicator in both reading and mathematics based on qualifying college ready exam score;
2. Met CCR indicator by completing and earning credit for two or more advanced level courses during any of the last two years of high school;
3. Met CCR indicator by enrolling in a CTE coherent sequence of courses for three or more high school course credits as part of a 4-year plan of study; and
4. Met more than one of the CCR graduate indicators.

I then established postsecondary enrollment patterns and college persistence rates through the NSC database and reporting service. NSC also reports college enrollment patterns utilizing the district’s local student identification number.

Created in 1993, the NSC assists colleges, universities, and employers with tracking postsecondary success factors such as college enrollment and retention rates (Dynarski, Hemelt, & Hyman, 2015). NSC reports the beginning and end dates for each record of postsecondary enrollment for 6 years beyond high school graduation. The data fields include name of college or university of attendance, type of IHE, graduation dates, as well as degrees/certificates earned. NSC tracks and bi-annually reports the postsecondary enrollment status of students provided by the school district for a fee. The school district included in this study has provided NSC with local and state identification numbers of high school students within a graduating cohort for over 12 years. For this study, I matched student participation based on CCR indicators from the Texas Education with NSC postsecondary enrollment data. Since the data originated from the Texas Education Agency's graduation records for the school district there were no missing data fields included in this study. A student either had a record of postsecondary enrollment or did not.

Procedures

Being a non-experimental study, neither the independent nor the dependent variables were manipulated as they had already occurred. For RQ1 (Is there a statistically significant difference in postsecondary enrollment between Hispanic high school graduates identified as college and career ready and non-CCR graduates?), the independent variables of interest was group membership comprised of non-CCR high school graduates and high school graduates who met one or more of the CCR indicators. I defined the first research question's outcome, or dependent variable, of postsecondary enrollment as enrollment in IHE coursework at any time during the first or second year immediately following high school graduation.

The independent variable for RQ2 (Is there a statistically significant difference in postsecondary enrollment between Hispanic males and Hispanic females identified as college and career ready and non-CCR graduates?) became group membership of non-CCR high school graduates and CCR graduates by gender. The second research question's outcome, or dependent variable, remained postsecondary enrollment as previously defined.

For RQ3 (Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates?), the independent variable was defined by type of CCR indicator. The outcome, or dependent variable of postsecondary resiliency, was continued enrollment in IHE or the earning of industry certificates/college degrees within 2 years following high school graduation.

Lastly, for RQ4 (Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates at 2-year and 4-year institutes of higher education?), I examined persistence in postsecondary education based on the type of IHE initially attended by a Hispanic high school graduate. While the dependent variable remained postsecondary resiliency, the independent variable became the type of postsecondary education initially attended by a Hispanic high school graduate in terms of 2-year or 4-year IHE and CCR indicator.

Data Analysis

To test the likelihood of postsecondary participation, I used chi-square tests of independence for all hypotheses. Researchers commonly select chi-square "to explore the relationship between two categorical variables" (Pallant, 2013, p. 225). As a nonparametric test of significance, it allows for meaningful comparison between observed differences and expected frequencies for the variables selected (Gay et al., 2012). Within this study, the outcome event was nominal (categorical) in that it either occurred, e.g., student entered into IHE or did not. Likewise, the independent variables of CCR, gender and IHE were both mutually exclusive thereby categorical data. Within SPSS, the test statistics table reports chi-square values in terms of degrees of freedom, *p* values, expected counts in comparison to observed counts as well as the percentage of actual participant counts for the observed data (Pallant, 2013). Upon the approval by the University of North Texas Institutional Review Board, I used SPSS 22 to calculate descriptive statistics under the crosstabs procedures.

To conduct the study I used four separate chi-square tests of independence with the same sample population from a 2014 cohort of high school graduates. For RQ1, I hypothesized Hispanic high school graduates identified as CCR were more likely to enroll in postsecondary education. I tested the likelihood of postsecondary enrollment with a 2x3 chi-square test of independence. As depicted within Figure D.3, the independent variable of interest was group membership comprised of non-CCR high school graduates and high school graduates who met one or more of the CCR indicators. The outcome, or dependent variable of postsecondary enrollment, for RQ 1 was enrollment in IHE coursework at any time during the first or second year immediately following high school graduation.

		Postsecondary Enrollment (dependent variable)		
		Did not enroll at IHE	Enrolled at 2-year IHE	Enrolled at 4-year IHE
CCR Indicator (independent variable)	Non-CCR			
	CCR graduate			

Figure D.3. Diagram of 2x3 contingency table of Hispanic enrollment at an institute of higher education by college and career readiness indicator.

For RQ2, I hypothesized CCR was associated with differences in postsecondary enrollment for Hispanic male and female high school graduates. For the second chi-square test, the independent variable of interest remained group membership comprised of non-CCR high school graduates and high school graduates who met one or more of the CCR indicators. With the addition of gender as an independent variable, I generated a 4x3 contingency table with postsecondary enrollment remaining the outcome, or dependent variable as shown in Figure D.4.

		Postsecondary Enrollment (dependent variable)		
		Did not enroll at IHE	Enrolled at 2-year IHE	Enrolled at 4-year IHE
CCR Indicator (independent variable)	Non-CCR male			
	Non-CCR female			
	CCR male			
	CCR female			

Figure D.4. Diagram of 4x3 contingency table of Hispanic enrollment at an institute of higher education by college and career readiness indicator and gender.

Next, to provide insight as to whether an accountability indicator related to postsecondary resiliency, I hypothesized CCR indicators predicted differences in persistence in postsecondary education for Hispanic high school graduates. I tested the likelihood of postsecondary resiliency with an 8x2 chi-square test of independence as shown in Figure D.5.

The independent variable for RQ3 was type of CCR indicator. Since a student could meet all, some, or none of the reported CCR indicators, I classified participants into one of eight independent variable categories:

1. non-CCR participants;
2. students identified as only meeting the college readiness benchmark exam score;
3. students who only earned credit for at least two advanced/dual enrollment courses;

4. students who only enrolled in a CTE coherent sequence of courses as part of a four-year plan of study taking two or more CTE courses for three or more high school credits;
5. students who met the college readiness benchmark score and earned credit for advanced/dual enrollment;
6. students who earned credit for advanced/dual enrollment and participated in coherent sequence of CTE high school courses;
7. students who met the college readiness benchmark score and participated in coherent sequence of CTE high school courses; or
8. students who met all three postsecondary CCR indicators.

		Postsecondary Resiliency (dependent variable)	
		Did not meet	Met
CCR Indicator (independent variable)	Non-CCR graduate		
	CCR by exam		
	CCR by course		
	CCR by CTE		
	CCR by exam + CCR by course		
	CCR by course + CCR by CTE		
	CCR by exam + CCR by CTE		
	CCR by exam + CCR by course + CCR by CTE		

Figure D.5. Diagram of 8x2 contingency table of Hispanic persistence in postsecondary education by type of college and career readiness indicator.

I defined the outcome of postsecondary resiliency as students who demonstrated continued enrollment at an IHE or persisted to completion with a certification or diploma within the first 2 years following high school graduation.

Since an academic school year is an arbitrary timeframe established by an independent organization to identify the beginning and ending of an instructional period required to meet course credit, various IHE offer multiple semesters of course study. Typically 2-year and 4-year public IHE in Texas enroll students utilizing a fall, spring, and summer pattern. However, within these common enrollment cycles, students may also have an opportunity to complete a course on an accelerated pace within 9 weeks during fall or spring semesters. Summer options could include mini-May, or 3 week courses, as well as short-term, 6 week and long-term, 12 week courses. Furthermore, IHE now offer online and hybrid courses where students can complete course credit at their own pace within a designated timeframe of 3 to 12 weeks.

For the purposes of this study, I defined an academic school year in terms of fall and spring semesters. Fall semester postsecondary enrollment was enrollment at an IHE with a beginning date of August through September and an ending enrollment date between October and December of the same calendar year. Spring semester postsecondary enrollment had a beginning date between January and February with an ending enrollment date of March through May.

Students wishing to either accelerate their degree plan or improve grade point averages with grade replacement options usually complete student enrollment in summer coursework. Since the focus of the research questions was continued enrollment in an IHE leading to industry certificate or diploma, I excluded summer enrollment at an IHE. Subsequently, a student could meet the criteria for postsecondary resiliency by:

1. enrolling in IHE during the fall semester of 2014 and returning for one or more semesters during the 2015-16 academic school year;
2. enrolling in IHE during the spring semester of 2015 and returning for one or more semesters during the 2015-16 academic school year;
3. enrolling in IHE during the fall semester of 2015 and returning for the spring semester of 2016;
4. enrolling in IHE within the first year after high school graduation and earning an industry certification, 2-year degree, or 4-year degree by spring semester of 2015;
5. enrolling in IHE within the first year after high school graduation and earning an industry certification, 2-year degree, or 4-year degree during the 2015-16 academic school year; or
6. enrolling in IHE within the second year after high school graduation and earning an industry certification, 2-year degree, or 4-year degree during the 2015-16 academic school year.

Lastly, to test RQ4, I hypothesized Hispanic high school graduates who initially enroll in a 2-year IHE are more likely to demonstrate characteristics of postsecondary resiliency. In this fourth chi-square test of independence, I tested the likelihood of postsecondary resiliency with a 4x2 contingency table. The dependent variable remained postsecondary resiliency. The independent variable became the type of postsecondary education initially attended by a Hispanic high school graduate in terms 2-year or 4-year IHE and their CCR designation (see Figure D.6).

		Postsecondary Resiliency (dependent variable)	
		Did not meet	Met
Postsecondary Enrollment (independent variable)	Non-CCR at 2-year IHE		
	Non-CCR at 4-year IHE		
	CCR at 2-year IHE		
	CCR at 4-year IHE		

Figure D.6. Diagram of 4x2 contingency table of Hispanic persistence in postsecondary education by type of institution of higher education.

APPENDIX E

UNABRIDGED RESULTS

Findings

The purpose of this study was to examine the association of college and career readiness (CCR) factors to postsecondary enrollment and resiliency outcomes for Hispanic students. Results presented within this appendix are in two sections: a) descriptive analysis, and b) chi-square analysis. The first section includes inferential statistics to describe where similarities and differences existed across each of the CCR indicators. The second section reports the findings of four separate chi-square tests of independence. To conduct the study, I collected 3 years of longitudinal student-level test scores and enrollment records from five high schools within the same North Texas area school district. Research participants consisted solely of Hispanic graduates from the 2014 cohort representing 48.9% of the total number of students (N = 1,641) from the graduating class. To be included, participants either had state exam data on file with the Texas Education Agency (TEA) or reported their enrollment at one of the district's high schools during self-registration for a college entrance exam (SAT/ACT). Additionally, by using local or state identification numbers issued to each student I gathered and matched postsecondary enrollment records from an outside organization, the National Student Clearinghouse (NSC). Therefore, it is important to note that the findings in this study do not describe the total CCR levels of all students in the district, but rather those who meet the selection and matching criteria.

Descriptive Analysis

Overall Population

Frequency statistics for participants included in the study reveal males slightly outpaced females in the area of non-CCR graduates and females slightly outpaced males with regard to CCR graduates; of which, differences existed between gender groupings by more than 7 percentage points as shown in Table E.1. Males comprised 58.2% (*n* = 85) of non-CCR Hispanic graduates and 10.6 % of overall sample. In comparison, females (*n* = 61) represented 41.8% of non-CCR Hispanic graduates and 7.6% of overall sample. With regard to CCR graduates, Hispanic males (*n* = 301) represented 45.8% of CCR sub-group or 37.5% of the sample population. CCR females (*n* = 356) represented 54.2% and 44.3% respectively.

Table E.1

Frequency Statistics for Participant Demographics

	Dependent Variables					
	Total Sample Group (*N* = 803)		Non-CCR Group (*n* = 146)		CCR Group (*n* = 657)	
Independent Variables	%	Obs.	%	Obs.	%	Obs.
Gender						
Male	48.1	386	58.2	85	45.8	301
Female	51.9	417	41.8	61	54.2	356
Free/Reduced						
Non-participant	22.5	181	19.9	29	23.1	152
Participant	77.5	622	80.1	117	76.9	505
Gifted and Talented						
Non-participant	90.8	729	97.9	143	89.2	586
Participant	9.2	74	2.1	3	10.8	71

Note. Obs. = observed frequency counts.

Within the total sample group, 77.5% (*n* = 622) were identified as economically disadvantaged through participation in free/reduced lunch program. Similarly a large majority of the same students within the non-CCR group (80.1%, *n* = 117) and CCR group (76.9%, *n* = 505) identified as economically disadvantaged. Within this same student population, overall 9.2% (*n* = 74) participated in the gifted and talented (G/T) program overall representing 2.1% (*n* = 3) of non-CCR graduates and 10.8% (*n* = 71) CCR graduates.

Table E.2 depicts frequency statistics for postsecondary enrollment based on gender and program participation. Overall, 45.5% (*n* = 365) attended an institute of higher education (IHE) within 2 years of high school graduation. In terms of gender, females (53.8%, *n* = 197) slightly outpaced males (46.2%, *n* = 168) in postsecondary enrollment.

Table E.2

Frequency Statistics for Postsecondary Enrollment by Participant Demographics

	Dependent Variables					
	Total Sample Group (*N* = 803)		Did not enroll IHE (*n* = 438)		Enrolled IHE (*n* = 365)	
Independent Variables	%	Obs.	%	Obs.	%	Obs.
Gender						
Male	48.1	386	49.8	218	46.0	168
Female	51.9	417	50.2	220	54.0	197
Free/Reduced						
Non-participant	22.5	181	18.3	80	27.7	101
Participant	77.5	622	81.7	358	72.3	264
Gifted and Talented						
Non-participant	90.8	729	94.5	414	86.3	315
Participant	9.2	74	5.5	24	13.7	50

Note. Obs. = observed frequency counts.

Students participating in free/reduced program comprised a large majority of both IHE student groups. However, there was nearly a 10 percentage point difference between low-income non-IHE participants (81.7%, *n* = 358) and the low-income IHE enrollee group (71.6%, *n* = 264). Hispanic G/T students comprised 13.5% of IHE enrollees (*n* = 50). Whereas a majority of G/T Hispanics enrolled in IHE, there was no record of IHE enrollment for 32.4% of Hispanic G/T students (*n* = 24) comprising 5.5% of non-IHE participants.

Table E.3 depicts frequency statistics for postsecondary resiliency based on gender and program participation. Overall 67.4% (*n* = 246) persisted in IHE through continued enrollment or completion by earning a diploma or industry-certification within 2 years. In terms of gender, females (54.5%, *n* = 134) slightly outpaced males (45.5%, *n* = 112). With regard to socio-economic status, participants in the free/reduced lunch program were represented similarly across the total sample group (72.3%, *n* = 264), participant group failing to persist (75.6%, *n* = 90) and participant group of those who did return to IHE (70.7%, *n* = 174).

Table E.3

Frequency Statistics for Participant Postsecondary Resiliency

	Dependent Variables					
Independent Variables	Total Sample Group (*n* = 365)		Did not meet (n = 119)		Met (*n* = 246)	
	%	Obs.	%	Obs.	%	Obs.
Gender						
Male	46.0	168	47.1	56	45.5	112
Female	54.0	197	52.9	63	54.5	134
Free/Reduced						
Non-participant	27.7	101	24.4	29	29.3	72
Participant	72.3	264	75.6	90	70.7	174
Gifted and Talented						
Non-participant	86.3	315	93.3	111	82.9	204
Participant	13.7	50	6.7	8	17.1	42

Note. Profile of Hispanic high school graduates selected for inclusion in study. Obs. = observed frequency counts.

Throughout the course of this study, seven students persisted to completion within 1 year following high school graduation by earning an industry certification (*n* = 4), 2-year degree (*n* = 2), or 4-year diploma (*n* = 1). At the close of the study, 16 students persisted to completion within 2 years following high school graduation by earning an industry certification (*n* = 7), 2-year degree (*n* = 6), or 4-year diploma (*n* = 3). After completing descriptive statistics based on demographic characteristics, I then examined postsecondary enrollment in terms of CCR as shown in Table E.4. A large majority of participant enrollment in IHE were students meeting at least one of the CCR graduate indicators (87.7%, *n* = 320) as compared to non-CCR graduates (12.3%, *n* = 45). However, CCR graduates also comprised a large majority of students with no record of enrollment at IHE within 2 years of high school graduation (76.9%, *n* = 337).

Table E.4

Frequency Statistics for Postsecondary Enrollment in IHE by CCR Indicator

	Dependent Variables					
	Total Sample Group (*N* = 803)		Did not enroll IHE (*n* = 438)		Enrolled IHE (*n* = 365)	
Independent Variable	%	Obs.	%	Obs.	%	Obs.
Non-CCR Graduate	18.2	146	23.1	101	12. 3	45
CCR Graduate	81.8	657	76.9	337	87.7	320

Note. Obs. = observed frequency counts.

Out of all the participants who enrolled in IHE (*n* = 365), two-thirds met the postsecondary resiliency criteria (67.4%, *n* = 246) as shown in Table E.5. A substantial majority of these students were CCR graduates (91.5%, *n* = 225). In comparison, non-CCR graduates comprised less than 10 percent of the same population (8.5%, *n* = 21).

Table E.5

Frequency Statistics for Postsecondary Resiliency in IHE by CCR Indicator

	Dependent Variables					
	Total Sample Group (*N* = 365)		Did not meet (*n* = 119)		Met (*n* = 246)	
Independent Variable	%	Obs.	%	Obs.	%	Obs.
Non-CCR Graduate	12.3	45	20.2	24	8.5	21
CCR Graduate	87.7	320	79.8	95	91.5	225

Note. Obs. = observed frequency counts.

Next, to provide a more descriptive analysis of the CCR characteristics attributed to Hispanic high school graduates, I categorized students based on the number of CCR indicators met which yielded four distinct classifications. The first grouping was students who did not meet any of the possible indicators identified as non-CCR graduates. The second grouping was students who met only one of the CCR indicators, e.g., college readiness qualifying exam score, credit for at least two advanced/dual enrollment courses, or enrollment in a CTE coherent sequence of courses. The third grouping was students who met any two of the CCR indicators. Lastly, the fourth group was comprised of students who met all three postsecondary CCR indicators.

Non-CCR Hispanic High School Graduates

Non-CCR graduates comprised 18.2% (*n* = 146) of the overall population (*n* = 803). While non-CCR graduate enrollment in IHE (*n* = 45) represented 5.6% of the overall sample, they accounted for 12.3% of Hispanic enrollment in IHE. Yet, fewer than half (*n* = 21) demonstrated postsecondary resiliency. Table E.6 depicts the frequency statistics by type of CCR indicator in terms of gender.

Table E.6

Frequency Statistics for Hispanic High School Graduates by Type of CCR and Gender

	Independent Variables					
	Total Sample Group (*N* = 803)		Males (*n* = 386)		Females (*n* = 417)	
Dependent Variables	%	Obs.	%	Obs.	%	Obs.
Non-CCR Graduate	18.2	146	22.0	85	14.6	61
CCR Graduate with 1 Indicator	34.5	277	35.5	137	33.6	140
Exam	5.2	42	6.7	26	3.8	16
Course	11.2	90	9.6	37	12.7	53
CTE	18.1	145	19.2	74	17.0	71
CCR Graduate with 2 Indicators	33.9	272	30.6	118	36.9	154
Exam + Courses	21.4	172	18.4	71	24.2	101
Courses + CTE	6.6	53	6.7	26	6.5	27
Exam + CTE	5.9	47	5.4	21	6.2	26
CCR Graduate with 3 Indicators	13.4	108	11.9	46	14.9	62

Note. Obs. = observed frequency counts.

Table E.7 depicts the frequency statistics by type of CCR indicator in terms of socio-economic status. More Hispanic males than Hispanic females comprised the non-CCR group (*n* = 146). Whereas females represented 41.8% (*n* = 61) of non-CCR graduates, they accounted for 7.6% of the overall sample group. In comparison, males represented 58.2% (*n* = 85) of non-CCR graduates accounting for 10.6% of the overall sample. A large majority of non-CCR students, 80.3% (*n* = 118) identified as economically disadvantaged. They accounted for 19.0% of all free/reduced participants (*n* = 622). Only 2% (*n* = 3) of non-CCR graduates participated in the G/T program.

Table E.7

Frequency Statistics for Hispanic High School Graduates by Type of CCR and Socio-economic Status

	Independent Variables (Free/Reduced Program)					
	Total Sample Group (*N* = 803)		Non-Participant (*n* = 181)		Participant (*n* = 622)	
Dependent Variables	%	Obs.	%	Obs.	%	Obs.
Non-CCR Graduate	18.3	147	16.0	29	19.0	118
CCR Graduate with 1 Indicator	34.4	276	34.3	62	34.4	214
Exam	5.2	42	4.4	8	5.5	34
Course	11.2	90	13.8	25	10.5	65
CTE	17.9	144	16.0	29	18.5	115
CCR Graduate with 2 Indicators	33.9	272	35.4	64	33.4	208
Exam + Courses	21.4	172	23.8	43	20.7	129
Courses + CTE	6.6	53	5.5	10	6.9	43
Exam + CTE	5.9	47	6.1	11	5.8	36
CCR Graduate with 3 Indicators	13.4	108	14.4	26	13.2	82

Note. Obs. = observed frequency counts.

Hispanic CCR Graduates Meeting a Single CCR Indicator

Over a third of participants met at least one of the CCR indicators (34.5%, *n* = 277). Males at 35.5% (*n* = 137) and females at 33.6% (*n* = 140) were represented similarly within this category. Yet, slight differences existed between genders in terms of type of CCR indicator. Females completed advanced courses at a higher rate (12.7%, *n* = 53) than males (9.6%, *n* = 37). Conversely, males completed CTE coursework at a higher rate (19.2%, *n* = 74) than females (17.0%, *n* = 71). With regard to participation in a free/reduced lunch program, socio-economic status had little bearing for students meeting only one of the CCR indicators. Participants (34.4%, *n* = 214) and non-participants (34.3%, *n* = 62) each represented a third of their respective sub-groups.

Hispanic CCR Graduates Meeting Two CCR Indicators

Females comprised 36.9% (*n* = 154) of this category compared to 30.6% (*n* = 118) for males. This was primarily due to their slightly elevated representation for students meeting the qualifying exam score combined with the completion of advanced courses. There was relatively little difference between these same CCR student groups with regard to participation in a free/reduced lunch program. Similar to CCR graduates meeting a single indicator, those meeting two CCR indicators also represented a third of their respective sub-groups. Free/reduced participants were 35.4% (*n* = 64) while non-participants were at 33.4% (*n* = 208).

Hispanic CCR Graduates Meeting All Three CCR Indicators

Students who met all three postsecondary CCR indicators accounted for the fewest Hispanic high school graduates (13.4%, *n* = 108). Females slightly outpaced males by three percentage points 14.9% (*n* = 62) to 11.9% (*n* = 46) respectively. Once again, socio-economic status had relatively little bearing on students designated as meeting all three CCR indicators with participants at 13.2% (*n* = 82) and non-participants in free/reduced lunch program accounting for 14.4% (*n* = 26).

In summary, more Hispanic females 85.5% (*n* = 356) than Hispanic males 78.0% (*n* = 301) met at least one CCR indicator. Males were more likely to represent non-CCR graduates 22.0% (*n* = 85) in comparison to females 14.6% (*n* = 61). Hispanic males were also more likely to represent CCR graduates with only one indicator, (35.5%, *n* = 137) versus females (33.6%, *n* = 140) largely due to their participation in CTE (19.2%, *n*

= 74). Hispanic females were more likely to represent CCR graduates with two indicators (36.9%, *n* = 154) largely due to the combination of qualifying exam scores and advanced coursework at 24.2% (*n* = 101). Furthermore, Hispanic females were slightly more likely to graduate with all three CCR indicators at 14.9% (*n* = 62) as compared to Hispanic males at 11.9% (*n* = 46). Lastly, there was less than three percentage points difference between free/reduced program participants and non-participants in all categorized CCR graduate student groupings.

Chi-Square Analysis

To test the likelihood of postsecondary participation, I conducted four separate chi-square tests of independence using the same sample population from a 2014 cohort of high school graduates. Chi-square analysis is reported in two sections based on the research questions: likelihood of postsecondary enrollment with RQ1 and RQ2 and likelihood of postsecondary resiliency with RQ3 and RQ4. Guiding the study were the following research questions:

RQ1. Is there a statistically significant difference in postsecondary enrollment between Hispanic high school graduates identified as college and career ready and non-CCR graduates?

RQ2. Is there a statistically significant difference in postsecondary enrollment between Hispanic males and Hispanic females identified as college and career ready and non-CCR graduates?

RQ3. Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates?

RQ4. Is there a statistically significant difference in postsecondary resiliency between Hispanic high school graduates identified as college and career ready and non-CCR graduates at 2-year and 4-year institutes of higher education?

Chi-square test of independence is a nonparametric test of significance often referred to as chi-square test of association. It compares the observed frequency counts to the expected frequency count if there was no association between the independent and dependent variables:

> As the expected frequencies are predicted on there being no association, the greater the association between the two nominal variables, the greater you would expect the observed frequencies to differ to the expected frequencies. The converse is also true. The less the two nominal variables are associated, the closer the observed frequencies will be to the expected frequencies. (Laerd Statistics, 2017, para. 10)

"The formula for chi-square statistics (x^2) includes *O* as the observed frequency, *E* as the expected frequency and *k* representing the number of categories" (Hinkle et al., 2003, p. 547):

$$x^2 = \sum_{i=1}^{k} \frac{(O - E)^2}{E}$$

Hinkle et al. (2003) suggest a

> convenient way to calculate the expected frequency for each cell is to multiply the total row frequency (f_r) by the total column frequency (f_c) corresponding to the respective cell and then to divide this product by the total frequency (*n*). (p. 547)

Chi-square tests inform researchers of the likelihood of association between variable. On their own, chi-square tests do not provide information as to the strength of association. To conduct effect size statistics, Cramér's phi coefficient, Cramér's φ, provides a strength-of-relationship index for chi-square tests with more than two levels

(Cohen et al., 2011; Pallant, 2013). "Cramér's φ formula includes *k* as the smaller value of the contingency table's number of rows or columns" (Cohen et al., 2011, p. 472):

$$\text{Cramér's } \varphi = \sqrt{\frac{x^2}{\mathrm{N}\,(k-1)}}$$

Within this section, I report only formula calculations for the first chi-square. Formula calculations for the remaining three chi-square tests are located within supplemental tables in Appendix F.

Likelihood of Postsecondary Enrollment

I tested the likelihood of enrollment at IHE with the first two research questions. For RQ1, I hypothesized Hispanic high school graduates identified as CCR were more likely to enroll in postsecondary education. I tested the likelihood of postsecondary enrollment with a 2x3 chi-square test of independence. The independent variable of interest was group membership comprised of non-CCR high school graduates and those who met one or more of the CCR indicators. The dependent variable was enrollment in IHE coursework at any time during the first or second year immediately following high school graduation. For RQ2, I hypothesized CCR was associated with differences in postsecondary enrollment for Hispanic male and female high school graduates. With the addition of gender as an independent variable, I generated a 4x3 contingency table with postsecondary enrollment remaining the outcome, or dependent variable.

Chi-square analysis of postsecondary enrollment for Hispanic high school graduates by college and career readiness. Using the process suggested by Hinkle et al. (2003), the calculated expected counts for RQ1 were:

Graduate	*Did not enroll in IHE*	*Enrolled in 2-year*	*Enrolled in 4-year*
Non-CCR	$\frac{146 \text{ x } 438}{803} = 79.64$	$\frac{146 \text{ x } 208}{803} = 37.82$	$\frac{146 \text{ x } 157}{803} = 28.55$
CCR	$\frac{657 \text{ x } 438}{803} = 358.36$	$\frac{657 \text{ x } 208}{803} = 170.18$	$\frac{657 \text{ x } 157}{803} = 128.45$

The formula for the first chi-square statistic is reported in Table E.8.

Table E.8

Calculation of Frequencies Relating Type of High School Graduate to IHE Enrollment

f_o	f_e	f_o - f_e	$(f_o - f_e)^2$	$(f_o - f_e)^2 / f_e$
101	79.64	21.36	456.2496	5.729
337	358.36	-21.36	456.2496	1.273
35	37.82	-2.82	7.9524	0.210
173	170.18	2.82	7.9524	0.047
10	28.55	-18.55	344.1025	12.053
147	128.45	18.55	344.1025	2.679
803	803	0	0	21.91 = x^2

With the degree of freedom associated at 2 and the level of significance (α) set at .05, the critical value of the test statistic ($x^2{}_{cv}$) for the first contingency table was established as 5.991. Because the computed x^2 value (21.49) exceeds the critical value ($x^2{}_{cv}$ = 5.991), I failed to reject the hypothesis for RQ1. There was a statistically significant association between Hispanic high school graduate CCR and postsecondary enrollment, $x^2(2) = 21.49$, $p < .001$.

To investigate the statistical significance of the first chi-square test results, I then generated a cross-tabulation table within SPSS 22. Adequate sample size was met with no cells having an expected count less than 5. The outcome of the chi-square test statistic reported in Appendix G found the observed distribution of Hispanic high school students by CCR (IV) and postsecondary enrollment (DV) were not equal in the sample, x^2 = 21.987, p < .001. To determine the strength of the relationship between postsecondary enrollment and a high school graduate's CCR, I calculated Cramér's phi coefficient as

$$\text{Cramér's } \varphi = \sqrt{\frac{21.987}{803\,(2-1)}} = .165$$

Using Cohen's criteria, Cramér's φ = .165 falls between a small and moderate correlational measure of effect size (Cohen et al., 2011).

Next, I used two approaches available within SPSS to determine if one of the independent variables was a major contributor to the statistically significant x^2 value. The first approach was residual analysis; the second was a z-test of two proportions. Residuals are the differences between observed and expected values; "the larger the residual, the greater the contribution of the cell to the magnitude of the resulting chi-square obtained value" (Sharpe, 2015, p. 2). A closer examination of cell-by-cell calculation of cases determines which cells account for the greater source of statistical significance. Analysis of residuals, or a cell-by-cell comparison, allows researchers to identify cells with a large absolute adjusted standardized residual indicating where the lack of independence is occurring within the cross-tabulations (Laerd Statistics, 2017). SPSS reports the different calculations for residuals. Raw residuals, labeled simply as 'Residuals' in SPSS output, are "the product of subtracting expected from observed values" (Sharpe, 2015, p. 3). Whereas a standardized residual greater than +/- 2.0 can identify major contributions to significant chi-square value (Hinkle et al., 2003), "according to Agresti (2007) . . . adjusted standardized residuals 'having an absolute value that exceeds about 2 when there are few cells or about 3 when there are many cells indicates lack of fit in that cell'" (Sharpe, 2015, p. 3). "The formula for the adjusted standardized residual is an equation that takes into consideration the estimated standard error instead of the estimated standard deviation of the residual" (Sharpe, 2015, p. 3):

$$\text{Adj. Residual} = (O - E)\ /\sqrt{E * \left(1 - \frac{RowMarginal}{n}\right) * (1 - \frac{ColumnMarginal}{n})}.$$

Based on the recommendations for analyzing calculated residuals (Agresti, 2007, as cited in Sharpe, 2015; Delucchi, 1993; Sharpe, 2015; Thompson, 1988), I identified cells with the largest residual at an adjusted standardized absolute value of +/-3.0. As designated, those cells were associated with having the greater discrepancy, i.e., contribution, than expected within the x^2 obtained value.

Residual analysis for first chi-square test indicated two categories with the greatest discrepancy in differences between observed and expected counts for Hispanic postsecondary enrollment: (a) students who did not enroll at IHE and (b) students who enrolled in 4-year IHE. More non-CCR graduates and fewer CCR graduates did not enroll in postsecondary IHE than expected as shown in Table E.9. Conversely, fewer non-CCR graduates and more CCR graduates enrolled in a 4-year IHE than expected.

Next, to evaluate which of the independent variable groups differed in terms of postsecondary enrollment, I also conducted a post-hoc test that included pairwise comparisons with Bonferroni correction. The z-test of two proportions tests all pairwise comparisons between the independent variable groups to determine whether specific cells differed from each other. The Bonferroni adjustment reduces risk of Type I error by making corrections for multiple comparisons run on the same data set.

Table E.9

Comparison of Residuals for Type of High School Graduate and IHE Enrollment

Independent Variable	Postsecondary Enrollment (DV) Did not enroll IHE	Enrolled 2-year IHE	Enrolled 4-year IHE	Marginals
Non-CCR Graduate				
Obs. Count	101	35	10	146
Exp. Count	79.6	37.8	28.5	
Adj. Res.	**3.9**	-0.6	**-4.3**	
CCR Graduate				
Obs. Count	337	173.0	147	657
Exp. Count	358.4	170.2	128.5	
Adj. Res.	**-3.9**	0.6	**4.3**	
Marginals	438	208	157	803

Note. Adjusted residuals designated in italics are those that exceed the + / - 3. Obs. = Observed, Exp. = Expected, Adj. Res. = Adjusted Residual.

In doing so, a new alpha (α) level is calculated with the adjusted alpha level = original alpha level/number of comparisons (Laerd Statistics, 2017). With three sets of comparisons for each independent variable in RQ1, an adjusted alpha was calculated at .05/3 for the first post hoc test and set at $\alpha = .017$.

SPSS uses subscripts to designate if differences are statistically significance for each pairwise comparison at the adjusted alpha level. Using z-tests of two proportions with a Bonferroni correction, postsecondary enrollment differed significantly for both non-CCR graduates and CCR graduates as shown in Table E.10. The adjusted alpha level of $p < .017$ was met in four out of six pairwise comparisons for RQ1.

Table E.10

Post Hoc Test for Type of High School Graduate and IHE Enrollment

	Postsecondary Enrollment (DV)			
Independent Variable	Did not enroll IHE	Enrolled 2-year	Enrolled 4-year	Total
Non-CCR Graduate				
Obs. Count	101_a	35_a	10_b	146
Row %	69.2%	24.0%	6.8%	
Column %	23.1%	16.8%	6.4%	18.2%
CCR Graduate				
Obs. Count	337_a	173_a	147_b	657
Row %	51.3%	26.3%	22.4%	
Column %	76.9%	83.2%	93.6%	81.8%
Total				
Obs. Count	438	208	157	803
Row %	100%	100%	100%	
Column %	100%	100%	100%	100%

Note. Each subscript letter denotes subset of Postsecondary Enrollment whose column proportions do not differ significantly from each other at adjusted .017 alpha level. Obs. = Observed frequency.

Post-hoc analysis of the first chi-square test of independence reveals statistically significant differences existed between non-CCR graduates who did not enroll in IHE and those who enrolled in 4-year IHE (n = 101, 23.1% versus n = 10, 6.4%). Likewise, statistically significant differences existed between non-CCR graduates who enrolled in 2-year IHE and those who enrolled in 4-year IHE (n = 35, 16.8% versus n = 10, 6.4%). Similarly, statistically significant differences existed between CCR graduates who did not enroll in IHE and those who enrolled in 4-year IHE (n = 337, 76.9% versus n = 147, 93.6%) as well as CCR graduates who enrolled in 2-year IHE and those who enrolled in 4-year IHE (n = 173, 83.2% versus n = 147, 93.6%). However, in this pairwise comparison, statistically significant differences did not exist between non-CCR graduates who did not enroll in IHE and non-CCR graduates attending 2-year IHE (*n* = 101, 23.1% versus *n* = 35, 16.8%). Likewise, statistically significant differences did not exist for CCR graduates who did not enroll in IHE and non-CCR graduates attending 2-year IHE (*n* = 337, 76.9% versus *n* = 173, 83.2%).

Chi-square analysis of postsecondary enrollment for Hispanic high school graduates by college and career readiness and gender. Using a second chi-square test of independence, I examined the same group of students with gender included as an additional demographic variable to non-CCR and CCR graduates as shown in Table E.11. All expected cell frequencies were greater than 5. With *df* = 6 and α = .05, the critical value of the test statistic ($x^2{}_{cv}$) became 12.592.

Table E.11

Contingency Table for Type of High School Graduate and IHE Enrollment by Gender

Independent Variable	Postsecondary Enrollment (DV)						Total
	Did not enroll IHE		Enrolled 2-year IHE		Enrolled 4-year IHE		
	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	
Non-CCR Male	59	46.4	18	22.0	8	16.6	85
Non-CCR Female	42	33.3	17	15.8	2	11.9	61
CCR Male	159	164.2	73	78	69	58.9	301
CCR Female	178	194.2	100	92.2	78	69.6	356
Total	438		208		157		803

Note. Obs. = Observed frequency counts, Exp. = expected frequency counts.

Chi-square statistics reported by SPSS reveal distributions were not equal in population as shown in Appendix G. There was a statistically significant association between postsecondary enrollment and CCR by gender, $x^2(6) = 24.538$, $p < .001$. With

Cramér's φ = .124 the effect size of association was small (Cohen et al., 2011). In calculating residuals for RQ2, I found the largest adjusted standardized residuals were for non-CCR males and non-CCR females as shown in Table E.12. For the case of non-CCR females (n = 2, 3.3%), less than one-sixth (16.7%) enrolled in 4-year IHE than would be expected if the relationship between postsecondary enrollment and CCR was independent. Conversely, more non-CCR males than expected did not enroll in IHE (n = 59, 69.4%). Multiple z-tests for two proportions with a Bonferroni correction revealed there was not a statistically significant association between CCR males and postsecondary enrollment. However there was a statistically significant difference between non-CCR female enrollment in 4-year IHE (n = 2, 3.3%) and those who did not enroll (n = 42, 68.9%) or enrolled in 2-year IHE (n = 17, 27.9%). There was also statically significant differences between non-CCR males who did not enroll and those enrolled in 4-year IHE (n = 59, 69.4% versus n = 8, 9.4%) as well as CCR females who did not enroll and those enrolled in 4-year IHE (n = 178, 50% versus n = 78, 21.9%).

Likelihood of Postsecondary Resiliency

I tested the likelihood of postsecondary resiliency with the last two research questions. For RQ3, I hypothesized CCR indicators predicted differences in persistence in postsecondary education for Hispanic high school graduates. I tested the likelihood of postsecondary resiliency with an 8x2 chi-square test of independence. The independent variable of interest for RQ3 was type of CCR indicator.

Since a student could meet all, some, or none, of the reported CCR indicators, I classified participants into one of eight independent variable categories. The dependent variable was continued enrollment at an IHE or persistence to completion with a certification or diploma within the first 2 years following high school graduation.

Table E.12

Cross-tabulation of Hispanic High School Graduate by CCR and Gender (IV) and Postsecondary Enrollment (DV)

	Postsecondary Enrollment (DV)			
Independent Variable	Did not enroll IHE	Enrolled 2-year IHE	Enrolled 4-year IHE	Marginals
Non-CCR Male				
Obs. Count	59_{a}	$18_{a,b}$	8_{b}	85
Row %	69.4%	21.2%	9.4%	
Column %	13.5%	8.7%	5.1%	
Adj. Res.	2.9	-1.1	-2.5	
Non-CCR Female				
Obs. Count	42_{a}	17_{a}	2_{b}	61
Row %	68.9%	27.9%	3.3%	
Column %	9.6%	8.2%	1.3%	
Adj. Res.	2.3	0.4	**-3.3**	
CCR Male				
Obs. Count	159_{a}	73_{a}	69_{a}	301
Row %	52.8%	24.3%	22.9%	
Column %	36.3%	35.1%	43.9%	
Adj. Res.	-0.8	-0.8	1.9	
CCR Female				
Obs. Count	178_{a}	$100_{a,b}$	78_{b}	356
Row %	50.0%	28.1%	21.9%	
Column %	40.6%	48.1%	49.7%	
Adj. Res.	-2.3	1.3	1.5	
Marginals	438	208	157	803

Note. Adjusted residuals designated with italics are those that exceed the + / - 3. Each subscript letter denotes subset of Postsecondary Enrollment whose column proportions do not differ significantly from each other at adjusted .017 alpha level. Obs. = Observed frequency.

For RQ4, I hypothesized Hispanic high school graduates who initially enroll in a 2-year IHE are more likely to demonstrate characteristics of postsecondary resiliency. I tested the likelihood of postsecondary resiliency with a 4x2 contingency table. The dependent variable remained postsecondary resiliency; however, the independent variable became the type of postsecondary education initially attended by a Hispanic high school graduate in terms of 2-year or 4-year IHE and their CCR designation.

Chi-square analysis of postsecondary resiliency for Hispanic high school graduates by type of college and career readiness indicator. The contingency table of observed and expected frequencies for the 365 students who enrolled in IHE within the first 2 years following high school graduation is depicted in Table E.13. One cell, or 6.3% of the contingency table, had an expected count of less than 5. Older studies have followed Fisher's (1925) rule that only contingency tables with "no cells with expected frequencies less than five" could be included in chi-square analysis (Sharpe, 2015, p. 8). Delucchi (1993) as well as Ruxton and Neuhauser (2010) argue Cochran's revised recommendation for strengthening the common chi-square tests in 1954 is a more sufficient rule of thumb for minimum size. Since, it has become more common to establish minimum size requirement as no more than 20% of the cells having an expected frequency of 5 or less (Laerd Statistics, 2017; Sharpe, 2015), I determined the minimum size requirement was met for RQ2 chi-square analysis. Furthermore, all cells met the minimum expected count of 3.91.

The outcome of the chi-square test statistic reported in Appendix G found the observed distribution of Hispanic high school students by CCR type and postsecondary resiliency were not equal in the sample, $x^2(7) = 38.967$, $p < .001$. Since the computed x^2 (38.967) exceeded the critical value ($x^2_{cv} = 14.067$), I failed to reject the hypothesis for RQ3. There was a statistically significant association between type of CCR indicators and postsecondary resiliency as shown in Table E.14. The Cramér's φ coefficient value was .327, or a medium effect size.

Table E.13

Contingency Table for Persistence in Postsecondary Enrollment by Type of CCR Graduate

	Postsecondary Resiliency (DV)				
	Did not meet		Met		
Independent Variable	Obs.	Exp.	Obs.	Exp.	Total
Non-CCR Graduate	24	14.7	21	30.3	45
CCR Graduate with 1 Indicator					
Exam	7	3.9	5	8.1	12
Courses	16	13.7	26	28.3	42
CTE	20	11.7	16	24.3	42
CCR Graduate with 2 Indicators					
Exam + Courses	23	38.5	95	79.5	118
Courses + CTE	4	7.8	20	16.2	24
Exam + CTE	10	6.8	11	14.2	21
CCR Graduate with 3 Indicators					
Exam + Courses + CTE	15	21.8	52	45.2	67
	119		246		365

Note. Obs. = Observed frequency counts, Exp. = expected frequency counts.

The comparison of calculated residuals reported within Table E.14 show there was greater discrepancy than expected for CCR graduates with the combination of exam scores and advanced course, followed CTE closely by non-CCR graduates and CCR graduates with a CTE indicator. More students than expected by chance met the postsecondary resiliency criteria for CCR by exam and courses. Conversely, the reverse occurred for CCR graduates by CTE and non-CCR graduates.

Table E.14

Cross-tabulation of Type of Hispanic High School Graduate by CCR and Postsecondary Resiliency

Independent Variable		Postsecondary Resiliency (DV) Did not meet	Met	Marginals
Non-CCR Graduate				
	Obs. Count	24_a	21_b	45
	Row %	53.3%	46.7%	
	Column %	20.2%	8.5%	
	Adj. Res.	**3.2**	**-3.2**	
CCR Graduate with 1 Indicator				
Exam:	Obs. Count	7_a	5_a	12
	Row %	58.3%	41.7%	
	Column %	5.9%	2.0%	
	Adj. Res.	1.9	-1.9	
Courses:	Obs. Count	16_a	26_a	42
	Row %	38.1%	61.9%	
	Column %	13.4%	10.6%	
	Adj. Res.	0.8	-0.8	
CTE:	Obs. Count	20_a	16_b	36
	Row %	55.6%	44.4%	
	Column %	16.8%	6.5%	
	Adj. Res.	**3.1**	**-3.1**	
CCR Graduate with 2 Indicators				
Exam + Courses:				
Courses:	Obs. Count	23_a	95_b	118
	Row %	19.5%	80.5%	
	Column %	19.3%	38.6%	
	Adj. Res.	**-3.7**	**3.7**	
Courses + CTE:	Obs. Count	4_a	20_a	24
	Row %	16.7%	83.3%	
	Column %	3.4%	8.1%	
	Adj. Res.	-1.7	1.7	
Exam + CTE:	Obs. Count	10_a	11_a	21
	Row %	47.6%	52.4%	
	Column %	8.4%	4.5%	
	Adj. Res.	1.5	-1.5	
CCR Graduate with 3 Indicators				
Exam + Courses + CTE	Obs. Count	15_a	52_b	67
	Row %	22.4%	77.6%	
	Column %	12.6%	21.1%	
	Adj. Res.	-2.0	2.0	
Marginals		119	246	365

Note. Adjusted residuals designated with italics are those that exceed the + / - 3. Each subscript letter denotes subset of Postsecondary Resiliency whose column proportions do not differ significantly from each other at .05 alpha level. Obs. = Observed frequency, Adj. Res. = Adjusted Residual.

Fewer than expected Hispanic graduates with CTE coherent sequence of CCR indicators met postsecondary resiliency criteria. Likewise, fewer than expected non-CCR graduates met the postsecondary resiliency criteria.

Post hoc analysis shows four out of the eight overall student groups differed significantly from each other. There were statistically significant differences between non-CCR graduates who did not meet the postsecondary resiliency criteria than those who did (n = 24, 53.3% versus n = 21, 46.7%). For CCR graduates meeting only one CCR indicator, pairwise comparisons show there were statistically significant differences between CCR graduates with the CTE indicator who did not meet the postsecondary resiliency criteria than those who did (n = 20, 55.6% versus n = 16, 44.4%).

For CCR graduates meeting two of the CCR indicators, there were statistically significant differences between CCR graduates with exam scores and advanced courses who did not persist in IHE in comparison to CCR graduates who met the postsecondary resiliency criteria (n = 10, 47.6% versus n = 11, 52.4%). Lastly, there were statistically significant differences in postsecondary resiliency outcomes for Hispanic high school graduates meeting all three CCR indicators. More than expected by chance met postsecondary resiliency criteria than not (n = 52, 77.6% versus n = 15, 22.4%).

Chi-square analysis of postsecondary resiliency for Hispanic high school graduates by type of postsecondary enrollment. The last chi-square test of independence explored the association of postsecondary resiliency and CCR based on the type of IHE in which the student initially enrolled. Table E.15 depicts the contingency table of observed and expected frequencies for the 365 students who enrolled in IHE within the first 2 years following high school graduation in terms of type of IHE and CCR.

Table E.15

Contingency Table for Type of Postsecondary Enrollment by IHE and CCR (IV) and Postsecondary Resiliency (DV)

	Postsecondary Resiliency (DV)				
	Did not meet		Met		
Independent Variable	Obs.	Exp.	Obs.	Exp.	Total
Non-CCR at 2-year IHE	18	11.4	17	23.6	35
Non-CCR at 4-year IHE	6	3.3	4	6.7	10
CCR at 2-year IHE	71	55.4	99	114.6	170
CCR at 4-year IHE	24	48.9	126	101.1	150
Total	119		246		365

Note. Obs. = Observed frequency counts, Exp. = expected frequency counts.

With *df* = 3 and α = .05, the critical value of the test statistic ($x^2{}_{cv}$) was established at 7.815. Only one cell had an expected count less than 5 (12.5%) and all cells met a minimum expected count of 3.26. The outcome of the chi-square test statistic reported in Appendix G found the observed distribution of students meeting postsecondary resiliency were not equal in the sample, $x^2(3) = 34.373$, $p < .001$. Since the computed x^2 (34.373) exceeded the critical value ($x^2{}_{cv}$ = 7.815), there was a statistically significant association between Hispanic graduates and postsecondary resiliency outcomes based on CCR and type of IHE enrollment. The Cramér's φ coefficient value was .307, or medium effect size.

Residual analysis for the last chi-square test indicated two categories with the greatest discrepancy in differences between observed and expected counts for Hispanic postsecondary enrollment: (1) CCR graduates enrolled at 2-year IHE; and (2) CCR graduates enrolled at 4-year IHE. As reported within Table E.16, the comparison of calculated residuals shows those designated cells were associated with having the greater discrepancy, i.e., contribution, than expected within the x^2 obtained value 34.373.

There was a greater discrepancy than expected for both categories of CCR graduates. Hispanic CCR graduates enrolled at 4-year IHE provided the greatest contribution to differences. More students than expected by chance met the postsecondary criteria for CCR graduates who initially enrolled at 4-year IHE. Fewer students than expected by chance met the postsecondary criteria for CCR graduates who initially enrolled at 2-year IHE. Likewise, fewer students than expected by chance met the postsecondary criteria for non-CCR graduates who initially enrolled at 2-year IHE. Subsequently I rejected the hypothesis for RQ4.

Post hoc analysis with z-tests of two proportions show three out of the four student groups differed significantly from each other. The only pairwise comparison in which differences were not statistically significant occurred between students meeting or not meeting postsecondary resiliency for non-CCR graduates enrolled at 4-year IHE (n = 6, 60.0% versus n = 4, 40.0%). All other pairwise comparisons were statistically significant from each other at $p < .05$ alpha level. There were statistically significant differences between non-CCR graduates at 2-year IHE who did not meet the postsecondary resiliency criteria than those who did (n = 18, 51.4% versus n = 17, 48.6%). There was also statistically significant differences between CCR graduates at 2-year IHE who did not meet the postsecondary resiliency criteria than those who did (n

= 71, 41.8% versus *n* = 99, 58.2%). Lastly, there were statistically significant differences in postsecondary resiliency outcomes for CCR graduates at 4-year IHE who did not met the postsecondary resiliency criteria than those who did (*n* = 24, 16.0% versus *n* = 126, 84.0%).

Table E.16

Cross-tabulation for Type of Postsecondary Enrollment by IHE and CCR (IV) and Postsecondary Resiliency (DV)

	Postsecondary Resiliency (DV)		
Independent Variable	Did not meet	Met	Marginals
Non-CCR at 2-year IHE			
Obs. Count	18_a	17_b	35
Row %	51.4%	48.6%	
Column %	15.1%	6.9%	
Adj. Res.	2.5	-2.5	
Non-CCR at 4-year IHE			
Obs. Count	6_a	4_a	10
Row %	60.0%	40.0%	
Column %	5.0%	1.6%	
Adj. Res.	1.9	-1.9	
CCR at 2-year IHE			
Obs. Count	71_a	99_b	170
Row %	41.8%	58.2%	
Column %	59.7%	40.2%	
Adj. Res.	**3.5**	**-3.5**	
CCR at 4-year IHE			
Obs. Count	24_a	126_b	150
Row %	16.0%	84.0%	
Column %	20.2%	51.2%	
Adj. Res.	**-5.7**	**5.7**	
Marginals	119	246	365

Note. Adjusted residuals designated with italics are those that exceed the + / - 3. Each subscript letter denotes subset of Postsecondary Resiliency whose column proportions do not differ significantly from each other at .05 alpha level. Obs. = Observed frequency, Adj. Res. = Adjusted Residual.

APPENDIX F

SUPPLEMENTAL TABLES

Table F.1

Data Field Collection and Reporting Categories

SPSS Name	Category Descriptor	Coding
STUCODE	Masked student identification number	Continuous 1-803
	Demographic Variables	
GENDER	Gender	0:Male; 1:Female
ECODIS	Enrollment in free/reduced lunch program	0:Non-participant; 1:Participant
GT	Enrollment in gifted and talented program	0:Non-participant; 1:Participant
	Independent Variable	
CCR	Type of CCR accountability indicator	0:Non-participant 1: Met CCR by Exam 2: Met CCR by Courses 3: Met CCR by CTE 4: Met CCR by Exam & Courses 5: Met CCR by Courses & CTE 6: Met CCR by Exam & CTE 7: Met CCR by all 3
	Dependent Variables	
FALL14	Enrolled in IHE Fall semester 2014	0:Did not enroll; 1:Enrolled
SPRING15	Enrolled in IHE Spring semester 2015	0:Did not enroll; 1:Enrolled
FALL15	Enrolled in IHE Fall semester 2015	0:Did not enroll; 1:Enrolled
SPRING16	Enrolled in IHE Spring semester 2016	0:Did not enroll; 1:Enrolled
YEAR1	Enrolled in IHE within 1st year after HS	0:Did not enroll; 1:Enrolled
YEAR2	Enrolled in IHE during 2nd year after HS	0:Did not enroll; 1:Enrolled
ENROLL	Enrolled in IHE within 2 years after HS	0:Did not enroll; 1:2-year; 2:4-year
1STSEM	Enrollment by type of IHE at 1st semester	0:Did not enroll; 1:2-year; 2:4-year
RESILIENCY	Persisted in postsecondary enrollment	0:Did not meet; 1:Met
IHEGRAD	Earned IHE industry certification/diploma	0:No; 1:Yes
DEGREE	Type of IHE certificate or degree earned	0:Certificate; 1:Associate; 2:Bachelor

Table F.2

Cross-tabulation for RQ1 Hispanic High School Graduate by CCR (IV) and Postsecondary Enrollment (DV)

	Postsecondary Enrollment (DV)			
Independent Variable	Did not enroll IHE	Enrolled 2-year IHE	Enrolled 4-year IHE	Marginals
Non-CCR Graduate				
Obs. Count	101	35	10	146
Exp. Count	79.6	37.8	28.5	
Row %	69.2%	24.0%	6.8%	
Column %	23.1%	16.8%	6.4%	
Residuals	21.4	-2.8	-18.5	
Adj. Res.	**3.9**	-0.6	**-4.3**	
CCR Graduate				
Obs. Count	337	173	147	657
Exp. Count	358.4	170.2	128.5	
Row %	51.3%	26.3%	22.4%	
Column %	76.9%	83.2%	93.6%	
Residuals	-21.4	2.8	18.5	
Adj. Res.	**-3.9**	0.6	**4.3**	
Marginals	438	208	157	803

Table F.3

RQ2 Calculation of Frequencies Relating Hispanic High School Graduate by CCR and Gender (IV) to Postsecondary Enrollment (DV)

f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$(f_o - f_e)^2 / f_e$
59	46.4	12.6	158.76	3.422
42	33.3	8.7	75.69	2.273
159	164.2	-5.2	27.04	0.165
178	194.2	-16.2	262.44	1.351
18	22	-4	16	0.727
17	15.8	1.2	1.44	0.091
73	78	-5	25	0.321
100	92.2	7.8	60.84	0.660
8	16.6	-8.6	73.96	4.455
2	11.9	-9.9	98.01	8.236
69	58.9	10.1	102.01	1.732
78	69.6	8.4	70.56	1.014
803	803	0	0	24.447 = x^2

Table F.4

RQ3 Calculation of Frequencies Relating Type of Hispanic High School Graduate by CCR (IV) to Postsecondary Resiliency (DV)

f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$(f_o - f_e)^2 / f_e$
24	14.7	9.3	86.49	5.884
7	3.9	3.1	9.61	2.464
16	13.7	2.3	5.29	0.386
20	11.7	8.3	68.89	5.888
23	38.5	-15.5	240.25	6.240
4	7.8	-3.8	14.44	1.851
10	6.8	3.2	10.24	1.506
15	21.8	-6.8	46.24	2.121
21	30.3	-9.3	86.49	2.854
5	8.1	-3.1	9.61	1.186
26	28.3	-2.3	5.29	0.187
16	24.3	-8.3	68.89	2.835
95	79.5	15.5	240.25	3.022
20	16.2	3.8	14.44	0.891
11	14.2	-3.2	10.24	0.721
52	45.2	6.8	46.24	1.023
803	803	0	0	39.061 = x^2

Table F.5

RQ4 Calculation of Frequencies Relating Type of Postsecondary Enrollment by IHE and CCR (IV) to Postsecondary Resiliency (DV)

f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$(f_o - f_e)^2 / f_e$
18	11.4	6.6	43.56	3.821
6	3.3	2.7	7.29	2.209
71	55.4	15.6	243.36	4.393
24	48.9	-24.9	620.01	12.679
17	23.6	-6.6	43.56	1.846
4	6.7	-2.7	7.29	1.088
99	114.6	-15.6	243.36	2.124
126	101.1	24.9	620.01	6.133
365	365	0	0	34.292
342	342	0	0	34.292 = x^2

APPENDIX G

SPSS OUTPUT OF CHI-SQUARE CROSS-TABULATIONS

SPSS Output of Chi-Square Test Cross-tabulation for RQ1: Hispanic High School Graduate by CCR (IV) and Postsecondary Enrollment (DV)

Table G.1

Case Processing Summary–RQ1

Post-Secondary Enrollment	Cases					
	Valid		Missing		Total	
	N	%	*N*	%	*N*	%
Hispanic *	803	100.0	0	0.0%	803	100.0

Table G.2

*Hispanic * Postsecondary Enrollment Crosstabulation–RQ1*

Hispanic	Postsecondary Enrollment			Total
	Did not enroll	Enrolled 2-year IHE	Enrolled 4-year IHE	
Non-CCR Graduate				
Count	101	35	10	146
Expected Count	79.6	37.8	28.5	146.0
% within Hispanic	69.2%	24.0%	6.8%	100.0%
% within Postsecondary Enrollment	23.1%	16.8%	6.4%	18.2%
CCR Graduate				
Count	337	173	147	657
Expected Count	358.4	170.2	128.5	657.0
% within Hispanic	51.3%	26.3%	22.4%	100.0%
% within Postsecondary Enrollment	76.9%	83.2%	93.6%	81.8%
Total				
Count	438	208	157	803
Expected Count	438.0	208.0	157.0	803.0
% within Hispanic	54.5%	25.9%	19.6%	100.0%
% within Postsecondary Enrollment	100.0%	100.0%	100.0%	100.0%

Tabled G.3

Chi-Square Tests–RQ1

Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.987[a]	2	.000
Likelihood Ratio	25.509	2	.000
Linear-by-Linear Association	21.530	1	.000
N of Valid Cases	803		

Note. [a]. 0 cells (.0%) have expected count less than 5. The minimum expected count is 28.55.

Table G.4

Symmetric Measures – RQ1

		Value	Approx. Sig.
Nominal by Nominal	Phi	.165	.000
	Cramer's V	.165	.000
N of Valid Cases		803	

SPSS Output of Multiple z-tests for Two Proportions for RQ1: Hispanic High School Graduate by CCR (IV) and Postsecondary Enrollment (DV)

Table G.5.

*Hispanic * Postsecondary Enrollment Crosstabulation–RQ1–Multiple z-tests*

	Postsecondary Enrollment			
Hispanic	Did not Enroll	Enrolled 2-year IHE	Enrolled 4-year IHE	Total
Non-CCR Graduate				
Count	101_a	35_a	10_b	146
Residual	21.4	-2.8	-18.5	
Adjusted Residual	3.9	-.6	-4.3	
CCR Graduate				
Count	337_a	173_a	147_b	657
Residual	-21.4	2.8	18.5	
Adjusted Residual	-3.9	.6	4.3	
Total	438	208	157	803

Note. Each subscript letter denotes a subset of Postsecondary Enrollment categories whose column proportions do not differ significantly from each other with Bonferroni correction.

SPSS Output of Chi-Square Test Cross-tabulation for RQ2: Hispanic High School Graduate by CCR and Gender (IV) and Postsecondary Enrollment (DV)

Table G.6

Case Processing Summary–RQ2

	Cases					
	Valid		Missing		Total	
Postsecondary Enrollment	*N*	%	*N*	%	*N*	%
CCR by Gender *	803	100.0%	0	0.0%	803	100.0%

Table G.7

*CCR by Gender * Postsecondary Enrollment Crosstabulation–RQ2*

	Postsecondary Enrollment			
CCR by Gender	Did not Enroll	Enrolled 2-year IHE	Enrolled 4-year IHE	Total
Non-CCR Male				
Count	59	18	8	85
Expected Count	46.4	22.0	16.6	85.0
% within CCR by Gender	69.4%	21.2%	9.4%	100.0%
% within Postsecondary Enrollment	13.5%	8.7%	5.1%	10.6%
Non-CCR Female				
Count	42	17	2	61
Expected Count	33.3	15.8	11.9	61.0
% within CCR by Gender	68.9%	27.9%	3.3%	100.0%
% within Postsecondary Enrollment	9.6%	8.2%	1.3%	7.6%
CCR Male				
Count	159	73	69	301
Expected Count	164.2	78.0	58.9	301.0
% within CCR by Gender	52.8%	24.3%	22.9%	100.0%
% within Postsecondary Enrollment	36.3%	35.1%	43.9%	37.5%
CCR Female				
Count	178	100	78	356
Expected Count	194.2	92.2	69.6	356.0
% within CCR by Gender	50.0%	28.1%	21.9%	100.0%
% within Postsecondary Enrollment	40.6%	48.1%	49.7%	44.3%
Total				
Count	438	208	157	803
Expected Count	438.0	208.0	157.0	803.0
% within CCR by Gender	54.5%	25.9%	19.6%	100.0%
% within Postsecondary Enrollment	100.0%	100.0%	100.0%	100.0%

Table G.8

Chi-Square Tests–RQ2

Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.538[a]	6	.000
Likelihood Ratio	29.549	6	.000
Linear-by-Linear Association	16.096	1	.000
N of Valid Cases	803		

Note. [a]. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.93.

Table G.9

Symmetric Measures–RQ2

		Value	Approx. Sig.
Nominal by Nominal	Phi	.175	.000
	Cramer's V	.124	.000
N of Valid Cases		803	

SPSS Output of Multiple z-tests for Two Proportions for RQ2: Hispanic High School Graduate by CCR and Gender (IV) and Postsecondary Enrollment (DV)

Table G.10

*CCR by Gender * Postsecondary Enrollment Crosstabulation–RQ2*

	Postsecondary Enrollment			
CCR by Gender	Did not Enroll	Enrolled 2-year IHE	Enrolled 4-year IHE	Total
Non-CCR Male				
Count	59_{a}	$18_{a, b}$	8_{b}	85
Residual	12.6	-4.0	-8.6	
Adjusted Residual	2.9	-1.1	-2.5	
Non-CCR Female				
Count	42_{a}	17_{a}	2_{b}	61
Residual	8.7	1.2	-9.9	
Adjusted Residual	2.3	.4	-3.3	
CCR Male				
Count	159_{a}	73_{a}	69_{a}	301
Residual	-5.2	-5.0	10.1	
Adjusted Residual	-.8	-.8	1.9	
CCR Female				
Count	178_{a}	$100_{a, b}$	78_{b}	356
Residual	-16.2	7.8	8.4	
Adjusted Residual	-2.3	1.3	1.5	
Total	438	208	157	803

Note. Each subscript letter denotes a subset of Postsecondary Enrollment categories whose column proportions do not differ significantly from each other with Bonferroni correction.

SPSS Output of Chi-Square Test Cross-tabulation RQ3: Type of CCR Hispanic High School Graduate (IV) and Postsecondary Resiliency (DV)

Table G.11

Case Processing Summary–RQ3

	Cases					
	Valid		Missing		Total	
Type of CCR *	*N*	%	*N*	%	*N*	%
Postsecondary Resiliency	365	100.0%	0	0.0%	365	100.0%

Table G.12

*Type of CCR * Postsecondary Resiliency Crosstabulation–RQ3*

Type of CCR	Postsecondary Resiliency		Total
	Did not Meet	Met	
Non-CCR Graduate			
Count	24	21	45
Expected Count	14.7	30.3	45.0
% within Type of CCR	53.3%	46.7%	100.0%
% within Postsecondary Resiliency	20.2%	8.5%	12.3%
CCR by Exam			
Count	7	5	12
Expected Count	3.9	8.1	12.0
% within Type of CCR	58.3%	41.7%	100.0%
% within Postsecondary Resiliency	5.9%	2.0%	3.3%
CCR by Course			
Count	16	26	42
Expected Count	13.7	28.3	42.0
% within Type of CCR	38.1%	61.9%	100.0%
% within Postsecondary Resiliency	13.4%	10.6%	11.5%
CCR by CTE			
Count	20	16	36
Expected Count	11.7	24.3	36.0
% within Type of CCR	55.6%	44.4%	100.0%
% within Postsecondary Resiliency	16.8%	6.5%	9.9%
CCR by Exam + Courses			
Count	23	95	118
Expected Count	38.5	79.5	118.0
% within Type of CCR	19.5%	80.5%	100.0%
% within Postsecondary Resiliency	19.3%	38.6%	32.3%
CCR by Courses +CTE			
Count	4	20	24
Expected Count	7.8	16.2	24.0
% within Type of CCR	16.7%	83.3%	100.0%
% within Postsecondary Resiliency	3.4%	8.1%	6.6%

(*table continues*)

Type of CCR	Postsecondary Resiliency		Total
	Did not Meet	Met	
CCR by Exam +CTE			
Count	10	11	21
Expected Count	6.8	14.2	21.0
% within Type of CCR	47.6%	52.4%	100.0%
% within Postsecondary Resiliency	8.4%	4.5%	5.8%
CCR by All 3			
Count	15	52	67
Expected Count	21.8	45.2	67.0
% within Type of CCR	22.4%	77.6%	100.0%
% within Postsecondary Resiliency	12.6%	21.1%	18.4%
Total			
Count	119	246	365
Expected Count	119.0	246.0	365.0
% within Type of CCR	32.6%	67.4%	100.0%
% within Postsecondary Resiliency	100.0%	100.0%	100.0%

Table G.13

Chi-Square Tests–RQ3

Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38.967[a]	7	.000
Likelihood Ratio	38.744	7	.000
Linear-by-Linear Association	15.759	1	.000
N of Valid Cases	365		

Note. [a]. 1 cells (6.3%) have expected count less than 5. The minimum expected count is 3.91.

Table G.14

Symmetric Measures–RQ3

		Value	Approx. Sig.
Nominal by Nominal	Phi	.327	.000
	Cramer's V	.327	.000
N of Valid Cases		365	

SPSS Output of Multiple z-tests for Two Proportions for RQ3: Type of CCR Hispanic High School Graduate (IV) and Postsecondary Resiliency (DV)

Table G.15

*Type of CCR * Postsecondary Resiliency Crosstabulation–RQ3–Multiple z-tests*

Type of CCR	Postsecondary Resiliency		Total
	Did not Meet	Met	
Non-CCR Graduate			
Count	24_a	21_b	45
Residual	9.3	-9.3	
Adjusted Residual	3.2	-3.2	
CCR by Exam			
Count	7_a	5_a	12
Residual	3.1	-3.1	
Adjusted Residual	1.9	-1.9	
CCR by Course			
Count	16_a	26_a	42
Residual	2.3	-2.3	
Adjusted Residual	.8	-.8	
CCR by CTE			
Count	20_a	16_b	36
Residual	8.3	-8.3	
Adjusted Residual	3.1	-3.1	
CCR by Exam + Courses			
Count	23_a	95_b	118
Residual	-15.5	15.5	
Adjusted Residual	-3.7	3.7	
CCR by Courses +CTE			
Count	4_a	20_a	24
Residual	-3.8	3.8	
Adjusted Residual	-1.7	1.7	
CCR by Exam +CTE			
Count	10_a	11_a	21
Residual	3.2	-3.2	
Adjusted Residual	1.5	-1.5	
CCR by All 3			
Count	15_a	52_b	67
Residual	-6.8	6.8	
Adjusted Residual	-2.0	2.0	
Total	119	246	365

Note. Each subscript letter denotes a subset of Postsecondary Resiliency categories whose column proportions do not differ significantly from each other at the .05 level.

SPSS Output of Chi-Square Test Cross-tabulation for RQ4: Type of Postsecondary Enrollment by IHE and CCR (IV) and Postsecondary Resiliency (DV)

Table G.16

Case Processing Summary–RQ4

	Cases					
	Valid		Missing		Total	
	N	%	*N*	%	*N*	%
1st Semester IHE by CCR * Postsecondary Resiliency	365	100.0	0	0.0	365	100.0

Table G.17

*1st Semester IHE by CCR * Postsecondary Resiliency Crosstabulation*

1st Semester IHE by CCR	Postsecondary Resiliency		Total
	Did not Meet	Met	
Non-CCR 2-year IHE			
Count	18	17	35
Expected Count	11.4	23.6	35.0
% within 1st Semester IHE by CCR	51.4%	48.6%	100.0%
% within Postsecondary Resiliency	15.1%	6.9%	9.6%
Non-CCR 4-year IHE			
Count	6	4	10
Expected Count	3.3	6.7	10.0
% within 1st Semester IHE by CCR	60.0%	40.0%	100.0%
% within Postsecondary Resiliency	5.0%	1.6%	2.7%
CCR 2-year IHE			
Count	71	99	170
Expected Count	55.4	114.6	170.0
% within 1st Semester IHE by CCR	41.8%	58.2%	100.0%
% within Postsecondary Resiliency	59.7%	40.2%	46.6%
CCR 4-year IHE			
Count	24	126	150
Expected Count	48.9	101.1	150.0
% within 1st Semester IHE by CCR	16.0%	84.0%	100.0%
% within Postsecondary Resiliency	20.2%	51.2%	41.1%
Total			
Count	119	246	365
Expected Count	119.0	246.0	365.0
% within 1st Semester IHE by CCR	32.6%	67.4%	100.0%
% within Postsecondary Resiliency	100.0%	100.0%	100.0%

Table G.18

Chi-Square Tests–RQ4

Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	34.373[a]	3	.000
Likelihood Ratio	35.980	3	.000
Linear-by-Linear Association	26.391	1	.000
N of Valid Cases	365		

Note. [a]. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 3.26.

Table G.19

Symmetric Measures–RQ4

		Value	Approx. Sig.
Nominal by Nominal	Phi	.307	.000
	Cramer's V	.307	.000
N of Valid Cases		365	

SPSS Output of Multiple z-tests for Two Proportions for RQ4: Type of Postsecondary Enrollment by IHE and CCR (IV) and Postsecondary Resiliency (DV)

Table G.20

*1st Semester IHE by CCR * Postsecondary Resiliency Crosstabulation–Multiple z-tests*

1st Semester IHE by CCR	Postsecondary Resiliency		Total
	Did not Meet	Met	
Non-CCR 2-year IHE			
Count	18_a	17_b	35
Residual	6.6	-6.6	
Adjusted Residual	2.5	-2.5	
Non-CCR 4-year IHE			
Count	6_a	4_a	10
Residual	2.7	-2.7	
Adjusted Residual	1.9	-1.9	
CCR 2-year IHE			
Count	71_a	99_b	170
Residual	15.6	-15.6	
Adjusted Residual	3.5	-3.5	
CCR 4-year IHE			
Count	24_a	126_b	150
Residual	-24.9	24.9	
Adjusted Residual	-5.7	5.7	
Total	119	246	365

Note. Each subscript letter denotes a subset of Postsecondary Resiliency categories whose column proportions do not differ significantly from each other at the .05 level.

APPENDIX H

KEY TRANSITIONS AND INDICATORS OF STUDENT SUCCESS:

PERMISSION TO REPRINT

From: Parker, Patricia
Sent: Thursday, January 11, 2018 12:32 PM
To: lperna@gse.upenn.edu
Subject: Request for Copyright Permission to Reprint "Key Transitions and Indicators of Student Success"

Dr. Perna -

I am a doctoral candidate in the College of Education at University of North Texas. For my dissertation, I am examining the association between Hispanic post-secondary enrollment and resiliency outcomes based on the Texas accountability system's definition of college and career readiness.

I am writing to request permission to use an adapted figure (with appropriate citation) from *A framework for reducing the college success gap and promoting success for all* (2006), in my dissertation and any subsequent related publications. I have adapted the figure, titled "Key Transitions and Indicators of Student Success", by altering the location of the transition titles.

For your review, I have attached the adapted figure and an introduction to its use within my dissertation.

In appreciation of your time and consideration,
Patricia Parker
PhD Candidate
Teacher Education and Administration
College of Education
University of North Texas

[EXT] Re: Request for Copyright Permission to Reprint "Key Transitions and Indicators of Student Success"

PW Perna, Laura W <lperna@upenn.edu>
Fri 1/12, 4:26 PM
Parker, Patricia

Reply all

Inbox

Dear Patricia – Thank you for your note. I very much appreciate your interest in using this adapted figure.
As long as you cite the full source, this is fine with me.
Best wishes as you continue forward with your work! Congratulations in advance on finishing your degree!
Kindest regards,
Laura

APPENDIX I

TEXAS EDUCATION AGENCY:

PERMISSION TO REPRINT

Texas Education Agency

Commissioner Mike Morath

1701 North Congress Avenue • Austin, Texas 78701-1494 • 512 463-9734 • 512 463-9838 FAX • tea.texas.gov

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- Permission has been granted to use the materials listed below in your dissertation.

  Methodology for calculating Index 4: Postsecondary College and Career Readiness located on page 166 of Appendix K - Data Sources (with appropriate citation) from the *Accountability manual for Texas public school districts and campuses* (2015), in your dissertation and any subsequent related publications.

If you perform your activity as described in the below "original message" and attached hereto, then you have agreed to the terms and conditions listed within this communication.

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TEA Copyright Notice:

From: TEAINFO
Sent: Tuesday, August 22, 2017 5:24 PM
To: [redacted]
Subject: FW: obtaining permission to use figure in Dissertation for Allison Martinez

From: Parker, Patricia [mailto:PatriciaParker2@my.unt.edu]
Sent: Thursday, January 11, 2018 12:55 PM
To: Performance Reporting <Performance.Reporting@tea.texas.gov>
Subject: Request for Copyright Permission to Reprint "Methodology for Calculating Index 4: Postsecondary CCR"

To whom it may concern -

I am a doctoral candidate in the College of Education at University of North Texas. For my dissertation, I am examining the association between Hispanic postsecondary enrollment and resiliency outcomes based on the Texas accountability system's definition of college and career readiness.

I am writing to request permission to use the methodology for calculating Index 4: Postsecondary College and Career Readiness located on page 166 of Appendix K - Data Sources (with appropriate citation) from the *Accountability manual for Texas public school districts and campuses* (2015), in my dissertation and any subsequent related publications.

For your review, I have attached the adapted figure and an introduction to its use within my dissertation.

In appreciation of your time and consideration,

Patricia Parker

PhD Candidate

Teacher Education and Administration

College of Education

University of North Texas

APPENDIX J

UNIVERSITY OF NORTH TEXAS INSTITUTIONAL REVIEW BOARD APPROVAL

UNT

UNIVERSITY OF NORTH TEXAS

A green light to greatness.

THE OFFICE OF RESEARCH INTEGRITY AND COMPLIANCE

September 12, 2017

Dr. James Laney
Student Investigator: Patricia Parker
Department of Teacher Education & Administration
University of North Texas
RE: Human Subjects Application No. 17-376

Dear Dr. Laney:

In accordance with 45 CFR Part 46 Section 46.101, your study titled "Relationship of College and Career Readiness Indicators on Hispanic College Enrollment and Post-Secondary Resilience" has been determined to qualify for an exemption from further review by the UNT Institutional Review Board (IRB).

No changes may be made to your study's procedures or forms without prior written approval from the UNT IRB. Please contact The Office of Research Integrity and Compliance at 940-565-4643, if you wish to make any such changes. Any changes to your procedures or forms after 3 years will require completion of a new IRB application.

We wish you success with your study.

Sincerely,

[redacted]

Chad Trulson, Ph.D.
Professor
Chair, Institutional Review Board

CT:jm

1155 Union Circle, #310979 | Denton, Texas 76203-5017 | TEL: 940.369.4643 | FAX: 940.565.4277
TTY: 940.369.8652 | http://research.unt.edu

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THE OFFICE OF RESEARCH AND INNOVATION
Research and Economic Development

February 1, 2018

Dr. James Laney
Student Investigator: Patricia Parker
Department of Teacher Education & Administration
University of North Texas

Institutional Review Board for the Protection of Human Subjects in Research (IRB)
RE: Human Subject Application #17-376

Dear Dr. Laney:

The UNT IRB has received your request to modify your study titled "Association of College and Career Readiness Indicators on Hispanic College Enrollment and Postsecondary Resiliency." As required by federal law and regulations governing the use of human subjects in research projects, the UNT IRB has examined the request to revise the data collection instrument to include four research questions regarding statistically significant differences in postsecondary enrollment between Hispanic graduates and career ready and non-CCR graduates; and to change the title of the study to, "Association of College and Career Readiness Indicators on Hispanic College Enrollment and Postsecondary Resiliency." The modification to this study is hereby approved for use with human subjects.

Enclosed are the consent documents with IRB approval. Please copy **and use this form only** for your study subjects.

Please contact The Office of Research Integrity and Compliance at (940) 565-4643, if you wish to make changes or need additional information.

Sincerely,

[redacted]

Chad Trulson, Ph.D.
Professor
Chair, Institutional Review Board

APPENDIX K

DISTRICT RESEARCH APPROVAL

District Approval to Conduct Research Involving Students/Staff

[redacted] ISD

Department of Assessment and Accountability
Division of Educational Services

General Intentions & Limitations:

Within the limitations of the General Provision, it is the intention of the district to encourage district personnel to engage in meaningful and productive educational research, Furthermore the district supports the participation with university students and research facilities in scholarly inquiry related to education. The limitations listed below are intended to safe guard the rights of students and of district employees.

- The building principal has the final authority to refuse educational research on the campus for which he/she is charged with the responsibility for maintaining a safe, orderly, efficient and effective learning environment.
- The right of refusal extends throughout the duration of the project.
- If for any reason a principal finds that the research activities are disruptive to the learning environment then permission to conduct research can be revoked.
- The use of specific student names, the use of specific campus names, and the use of specific district employee names are not allowed within the scope of approved research proposals.
- Prior to the publication or presentation of research and at the end of the research study, a copy of the related findings must be submitted to Director of Assessment and Accountability.

Permission Granting Right to Research

Campus/Principals: [redacted]

Title of Research Study: Influence of college and career readiness accountability indicators on Hispanic college enrollment and postsecondary resiliency outcomes

Name of Researcher(s): Patricia Parker

Institutional Affiliation: University of North Texas

Publication of Research Intent: Academic

Length of Study Involvement: April 6, 2017 – December 15, 2017

I am familiar with the District Procedures for Research Involving Students and Staff. I have reviewed the Request for Research in [redacted] ISD submission for this study and grant permission to the researcher to conduct the study as described within the proposal.

[redacted] Signature of Chief Officer of Data & Technology	06 April 2017 Date of Signature
[redacted] Signature of Assoc. Superintendent, Educational Services	4/6/17 Date of Signature
[redacted] Director of Assessment & Accountability	04/06/2017 Date of Signature

February 12, 2018

RE: Permission to Conduct Research in [redacted]

Dissertation Topic: Association of College and Career Readiness Indicators on Hispanic College Enrollment and Postsecondary Resiliency

Dear [redacted]

This spring, I am entering into the defense of dissertation stage for my doctoral studies at the University of North Texas. The initial permission to conduct research was approved by [redacted] Associate Superintendent, and [redacted] Chief Officer of Data and Technology, in April of 2017.

One of my committee members recommended that I also receive your approval to conduct research in advance of submitting my dissertation for their review.

The purpose of my quantitative research was to study differences between Hispanic postsecondary enrollment and resiliency outcomes based on the Texas accountability system. I examined three CCR indicators: college-readiness exam scores, advanced level coursework completed during the last two years of high school, and participation in coherent sequence of CTE curriculum.

To conduct the study, I collected three years of longitudinal student-level test scores and enrollment records from all 5 high schools within the school district. Research participants consisted solely of Hispanic graduates from the 2014 cohort. Guiding the research were the following questions:

Is there a statistically significant difference in postsecondary enrollment between:

RQ1: Hispanic high school graduates identified as CCR and non-CCR graduates?
RQ2: Hispanic males and Hispanic females identified as CCR and non-CCR graduates?

Is there a statistically significant difference in postsecondary resiliency between:

RQ3: Hispanic high school graduates identified as CCR and non-CCR graduates?
RQ4: Hispanic high school graduates identified as CCR and non-CCR graduates at 2-year and 4-year institutes of higher education (IHE)?

Postsecondary enrollment was defined as enrollment at an IHE within the first two years immediately following high school graduation. Postsecondary resiliency was defined as continued enrollment at an IHE or completion of industry certificate/diploma within the two years following high school graduation. I conducted four separate chi-square tests of independence to determine the likelihood of college enrollment and the likelihood of postsecondary resiliency outcomes. Student confidentiality was maintained through the masking of data with a unique code tied to their locally assigned school number.

Please know that a copy of the dissertation is available for your review if you have questions related to the study or wish to receive additional information on the research design, data analytics, or findings.
Appreciatively,
Patricia Parker, PhD Candidate, University of North Texas

Request to conduct research in CFB is approved by [redacted]
on this date 2/27/2018.

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